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Efficiency of process interfaces

Case Alfa Laval Power and Offshore and Cruise

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ABSTRACT

Mettänen, Eveliina: Efficiency of process interfaces Case Alfa Laval Power and Offshore and Cruise
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The objective of the development work was to identify the current and wanted status of the interfaces of internal processes in Alfa Laval Power and Offshore and Cruise (P&O). The plan was also to define key performance indicators for the processes. As P&O has three-year strategy programme about operational excellence, among others, the work offered view for the internal issues related to the strategy programme.

For the work a case study was applied with the methods interview and document analysis. The interface between supply and project management was selected to be the case. The interview questions were built on same themes as the theoretical framework: processes, quality and continuous improvement. The interviewees were selected from both processes with different working roles to gain as wide understanding as possible of the studied phenomenon. For document analysis process flow charts and descriptions were studied. The research was made in September-November 2025.

It was found out that the interfaces and their demands are not defined in the process documentation. Some of the main challenges in the interfaces were related to process clarity and information flow between the processes. Lack of templates and framework was the biggest individual challenge that causes problems to work fluency in the interfaces. The average grade for interface functionality in the interviews was given to be 3,3/5.

The efficiency of process interfaces in the future can be improved with standardising and clear documentation. In addition, training for the personnel about other processes and their needs will help the interfaces to be more efficient. As the organisation is already planning to update the process documentation, the roles and responsibilities need to be clearly defined in the making. The principle of continuous improvement was seen as a good tool to maintain the efficiency of the interfaces after the biggest challenges are overcome. It can be seen to form an internal project for the organisation in the future.

Keywords: process, interface, quality, continuous improvement, case study, key performance indicator, standardisation

TIIVISTELMÄ

Mettänen, Eveliina: Prosessien rajapintojen tehokkuus Case Alfa Laval Power and Offshore and Cruise
Opinnäytetyö, ylempi AMK
Tulevaisuuden johtaminen
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Kehittämistyön tavoitteena oli tunnistaa sisäisten prosessien rajapintojen nykyinen ja tavoiteltava tila Alfa Laval Power and Offshore and Cruisella (P&O). Suunnitelmaan kuului myös prosessien suorituskykymittareiden määrittely. Koska P&O:lla on kolmen vuoden strategiaohjelma, joka sisältää muun muassa tavoitteen operatiivisesta erinomaisuudesta, työ tarjosi näkökulmaa strategiaohjelmaan liittyviin sisäisiin kysymyksiin.

Työssä käytettiin tapaustutkimusta haastattelun ja dokumenttianalyysin keinoin. Tapaukseksi valittiin hankinnan ja projektinhallinnan prosessien välinen rajapinta. Haastattelukysymykset rakennettiin samoille teemoille kuin teoreettinen viitekehys: prosessit, laatu ja jatkuva parantaminen. Haastateltaviksi valittiin henkilöitä molemmista prosesseista eri työskentelyrooleista, jotta saavutettaisiin mahdollisimman laaja ymmärrys tutkittavasta ilmiöstä. Dokumenttianalyysissä tarkasteltiin prosessikaavioita ja -kuvauksia. Tutkimus toteutettiin syys-marraskuussa 2025.

Todettiin, että rajapinnat ja niiden vaatimukset eivät ole määriteltyinä prosessidokumentaatiossa. Osa rajapintojen keskeisistä haasteista liittyy prosessien selvyyteen ja tiedonkulkuun prosessien välillä. Mallipohjien ja viitekehyksen puuttuminen oli suurin yksittäinen haaste, joka vaikeuttaa työn sujuvuutta rajapinnoissa. Haastatteluissa rajapintojen toimivuuden keskiarvosanaksi annettiin 3,3/5.

Tulevaisuudessa prosessien rajapintojen tehokkuutta voidaan parantaa standardoinnilla ja selkeällä dokumentaatiolla. Lisäksi henkilöstön koulutus muiden prosessien ja niiden tarpeiden osalta auttaa rajapintoja toimimaan tehokkaammin. Koska organisaatio suunnittelee jo prosessidokumentaation päivitystä, roolit ja vastuut prosesseissa tulee päivityksen yhteydessä määritellä selvästi. Jatkuvan parantamisen periaate voitiin nähdä hyvänä työkaluna rajapintojen tehokkuuden ylläpitämiseksi sen jälkeen, kun suurimmat haasteet on ratkaistu. Jatkuvan parantamisen voidaan tulevaisuudessa nähdä muodostuvan sisäiseksi projektiksi organisaatiossa.

Avainsanat: prosessi, rajapinta, laatu, jatkuva parantaminen, tapaustutkimus, suorituskykymittariston kehittäminen, standardointi

PREFACE

I want to thank for the possibility given to me to make the development work for Alfa Laval Power and Offshore and Cruise as an outsider. Especially I thank Mick for patience, guidance and talks we have had during the process. Thanks to advocate, test interviewee and all interviewees for taking the time to enable my research.

CONTENTS

LIST OF ABBREVIATIONS

ALA	Alfa Laval Aalborg Oy
KPI	Key performance indicator
P&O	Alfa Laval Power and Offshore and Cruise

1 INTRODUCTION

Quality Management is a systematic activity to ensure that an organisation's activities, products and services meet their requirements and comply with agreed rules and regulations. It is the management of responsibilities, activities, resources and events aiming to meet customer quality requirements. (Tricker, 2020, p. 33.) With the world turning more digital and automated, quality and the benefits it can bring to organisations are more important this day than ever (Angle, 2019, p. 9). According to Sharma (2025) quality should be the foundation for what is wanted from strategy, usually success.

A process is a repeated and structured set of activities. It consists of stages in which information or raw materials are processed into products and services in accordance with targets. A process is identified by the fact that it has a beginning, which is the input to the process, and an end, which is the final output. A process always has the goal to produce a product or service, and it can be repeated in a similar way several times. (Lindroos, 2024.)

The aim of the development work is to help Alfa Laval Power and Offshore and Cruise (P&O) in its continuous development. The organisation's three-year strategy programme "Pioneering positive impact – Sustainable continuity" focuses on profitability by targeting operational excellence, sustainability and product competitiveness, without increasing the business. The development work is related to identifying process interfaces and exploiting them in the operation of the processes. P&O needs this kind of research because their operations have been reorganised and, as a result, the quality management system documents need to be updated, and key performance indicators defined. (Griffiths, 2025a.) As process re-engineering aims to increase efficiency, in challenging economic times, process management is a highly topical issue.

2 BACKGROUND, OBJECTIVE AND SCOPE OF THE DEVELOPMENT WORK AT ALFA LAVAL POWER AND OFFSHORE AND CRUISE

Alfa Laval operates in the energy, food, marine and water sectors. It provides products and services to industries in 100 countries. The company is engaged to optimising processes and creating and promoting responsible growth. (Alfa Laval, 2023.)

P&O as an organisation is part of Alfa Laval business unit Heat and Gas systems, which belongs to Alfa Laval Marine division. P&O consists of two separate locations, Alfa Laval Aalborg Oy (ALA) in Rauma, Finland and Alfa Laval Singapore Pte in Singapore. P&O develops and supplies waste heat recovery systems and boilers for ships, offshore, process industries and power plants. The story of ALA goes back to 1964, to the shipyard in Uusikaupunki. Through several acquisitions, the organisation is now part of Alfa Laval. Through mergers, the organisation has achieved status of market leadership in steam boilers, hot oil systems and inert gas systems for the marine industry. P&O's innovative solutions to this field contribute to energy efficiency and emission reduction. (Alfa Laval, n.d.; Griffiths, 2025c.) The organisation structure of P&O is shown in figure 1.

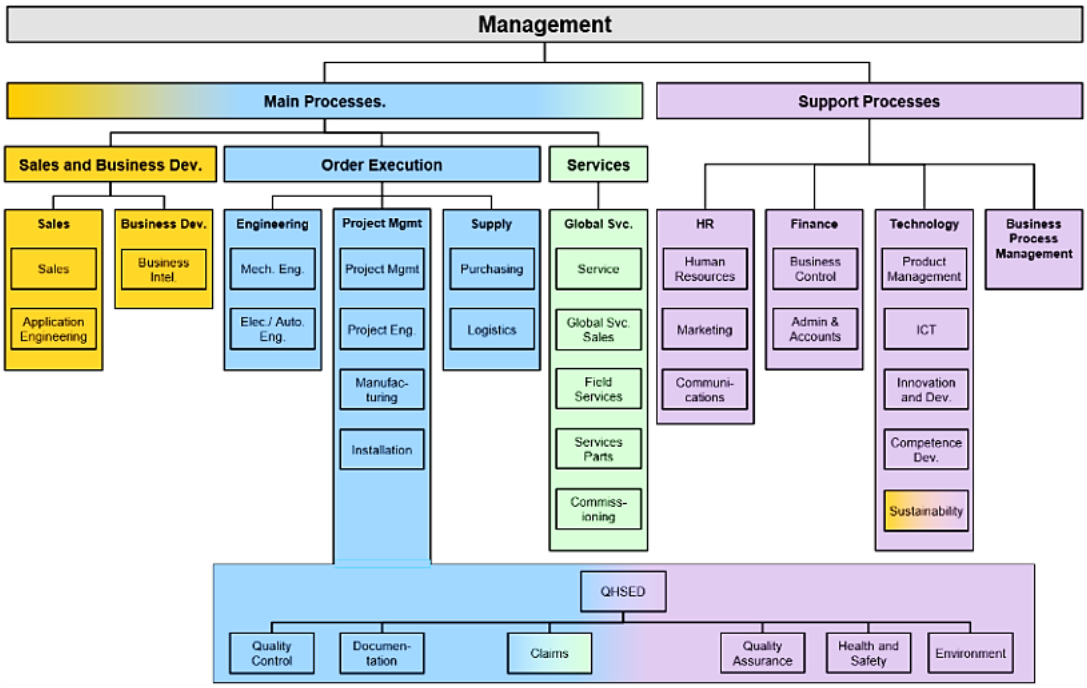

Figure 1. Organisation structure of P&O (Alfa Laval, 2024, p. 9)

The new three-year business strategy of P&O focuses on sustainable continuous development and one of the main areas is achieving operational excellence. To that belongs among others improving management system documents and developing useful key performance indicators (KPIs). The internal processes and KPIs need to be updated to represent business structure built by recent reorganisation. Customer satisfaction, internal audit planning and processes are part of achieving operational excellence. It is important to recognise possible areas of improvement in current processes as well as clarity and usability of processes. (Griffiths, 2025a.)

The manufacturing of each product is defined to be a project in P&O. The project receives its own project team and for example documentation. Once the project is through sales phase, the contract with supplier is signed and the project is handed over to project team, project's quality plan is created, in which common quality requirements are defined. They cover most or all project activities, i.e. design and engineering, purchasing and manufacturing. In the manufacturing phase are involved activities like material selection and management, welding and needed tests plus heat treatment, bolting, surface preparation, needed inspections, preparation and protection for transportation,

certification and release for transportation. The activities mentioned in the inspection and test plans depend on the design code, applicable standards and classification. If general classification or design code doesn't exist, internal best practices are followed. (Griffiths, 2025b.) Each interface of internal processes forms supplier-customer relationship in the organisation. Within the organisation in whole, this development work focuses on the interface of supply and project management.

2.1 Objective and scope of development work

The objective of this development work is to identify process interfaces, determine how they are working and define metrics for process performance. The scope includes studying how the process interfaces work currently and what would be the wanted status. In addition, the scope includes analysing quality documentation. The development work will be carried out in cooperation with process owners and other persons working on the studied processes.

The development work focuses on identifying process interfaces and defining KPIs for them. Now the interfaces can be seen in the process diagrams as a line between two swim lanes. However, the interfaces are not explained or monitored in any way and the requirements for interfaces are not defined. With the help of defining the interfaces detailed the suppliers of P&O could already in the bidding phase know which quality requirements the whole supply chain has. That could help situations where the manufacturing is already in process and it is noticed that a supplier of some part has not followed quality requirements, and it is necessary to move backwards in the supply chain. Defining the interfaces helps internal processes to work better together.

Defining the interfaces in this development work means the interfaces of internal processes. The goal for the work is to produce information about the function of the process interfaces and development proposals to make the functionality more efficient. The work is outlined to handle the interface of supply

and project management. The scope work does not include updating process flow charts and descriptions.

2.2 Research problem and research questions

The research problem handles the definition of process interfaces and the resulting process modification which will lead to editing process diagrams and descriptions. In addition, the measuring system for processes where problems occur in the interfaces, is related to the research problem.

Once a subject for the research is selected, it is helpful to create a research question. The research question tells what one wants to learn about the subject. Together with the approach, the research question will guide and organise the selection of the data that will be collected and analysed in the research. (Jegede, 2020, p. 51.) The research question provides a concise way to define the research interests and inform other people about them (Hiebert et al., 2023, p. 24).

To achieve the objective, the question ”How should processes, the process interfaces and the tasks of the process owners be developed to make the interfaces work as efficiently as possible?” must be answered. Supporting questions are as follows:

- What is current and wanted status of the process interfaces?
- What kind of KPIs are needed to monitor the efficiency of processes and their interfaces?
- How can the concept of continuous improvement be applied to process interfaces?

With the help of research questions, the current status of processes and their interfaces, what works well and what not, will be clarified. The wanted status of the processes and their interfaces will be clarified as well. The gap between these two will tell the area which needs to be focused on in the future. The

KPI's are to be determined especially for the issues which are in between current and wanted status of the processes.

2.3 Theoretical framework

Theoretical framework describes the central concepts related to the research subject and the semantic relationships the concepts have (Tuomi & Sarajärvi, 2018, p. 24). Theoretical framework is like a custom-made theory that has the focus on the questions asked in the research to gain answers. On one hand the theoretical framework tells why the expectations of the research are probable and on the other hand the researcher builds the theory to support the expectations. The theoretical framework also ensures that the researcher chooses the correct methods to gain the needed answers and that the interpretations the researcher makes out of the research material are appropriate. In addition, the theoretical framework educates the researcher as knowledge of the studied phenomenon increases. (Hiebert et al., 2022, pp. 51–55.)

The development work handles theoretical entity which consists of quality and process managements and continuous improvement. The theoretical framework is seen in figure 2.

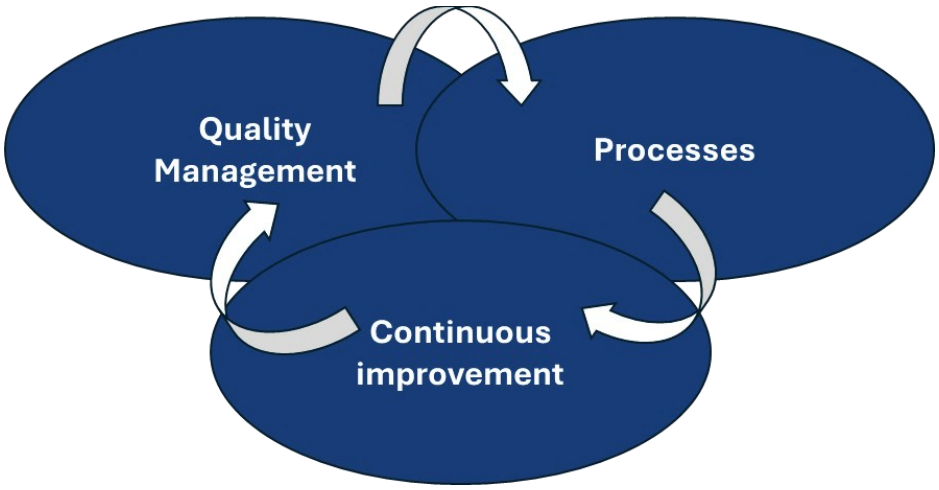

Figure 2. Theoretical framework for the development work

These areas include issues that are needed for defining the efficiency of process interfaces in P&O. The components form a cycle as each element affects the other

The purpose of quality management is to ensure that organisation's products and services are always consistently provided to the customer and that they meet the specified requirements. Quality management should be linked to strategy and be generally visible in management. Process descriptions and quality monitoring, among other things, belong to quality management. (Niemi, 2024, p. 93.) For the future of quality management, it looks like more comprehensive view to quality is taking over. Particularly the organisations emphasise the concepts of customer relationship and sustainable development. (Bergman et al., 2022, p. 105.)

Processes are the foundation to business operation as process is a planning of activities and resources that are needed to convert inputs into outputs that a customer would pay for. Some of the inputs will be transformed into outputs and some inputs are needed to do the work of transformation. Process' external customers are the ones that provide the revenue and therefore they are crucial to the organisation. Inside of an organisation the processes form a network where processes are customers and suppliers to each other. Eventually poor service to internal customers will become lousy service to external customers as well and therefore processes play an important role in competitiveness. (Slack & Brandon-Jones, 2021, pp. 6, 9, 12.)

Continuous improvement is about constantly improving performance with small steps. The advantage of small improvements is that they pretty easily can be followed by other small improvements. For continuous improvement it is not the rate that matters but the force of the improvement. This means that some kind of improvement has actually happened at regular intervals, regardless of the time span. Continuous improvement does not just happen, but it needs proper organising. To be successful in continuous improvement, organisation's culture needs to support it and there has to exist management support and commitment to it. (Slack et al., 2022, pp. 514–515, 537–538.)

The concepts of quality and process managements and continuous improvement are seen to be the foundation for the development work. It is because these issues need to be known thoroughly to be able to answer the research question about developing process interfaces to make them more efficient. The ultimate purpose of quality management is that products and services meet customer expectations. Quality management has several procedures and methods to perform this work. Process management is one of the main methods in quality management because quality is born in processes. Quality and process managements are associated with each other also through quality standard ISO 9001 as it is based on process-oriented thinking. Continuous improvement is part of both managements, and it is a key component in the research question in the part “as efficiently as possible”. These three concepts help the researcher to know the environment surrounding the research problem and therefore support the research.

3 APPROACH AND RESEARCH METHODS

The research problem is solved by an entity called an approach. The choice of approach is one of the most important tasks that a researcher decides in the work and the research question may offer help for it. The approach should provide the right information to solve the problem, and it consists of methods of data collection, analysis and interpretation. They are intended to produce a solution to the research problem. First and foremost, the nature of the problem determines whether a qualitative or quantitative approach should be used. (Kananen, 2015, pp. 63–64.) As the research question may have effect on the choice of approach, it is important that the researcher gives enough time for the research question to be formed properly (Jegede et al., 2020, p. 51).

3.1 Case study

In business, case study is a common research strategy and it's a good approach for generating development proposals. The subject of the study, i.e. the case, can be the whole or part of an organisation, a product or service, a process or an activity. (Ojasalo et al., 2015, p. 52.) The researcher must familiarise oneself with the literature on the studied phenomenon before being able to choose which case to focus on in the research (Vuori, 2021a, section Tapaustutkimus). According to Piekkari & Welch (2020, p. 208), it is the researcher who defines what a "case" means in one's research. There are several different ways to choose the case. The reason for choosing can be practical or theoretical, the choice can happen on the basis of the case being very typical or unique or for example revealing. (Vilkka, 2025, section Tapauksen rajaaminen.)

Since the purpose of a case study is to provide as comprehensive a picture of the case as possible, it allows to understand the subject of development in its real-life context. It is important to find out a lot about a narrow subject rather than to aim for extensive generalisations. A case study answers the questions ”why?” and ”how?”. Case study development work aims to produce new

information to support further development. The target is selected according to practical needs and the objectives set for the development work. It is natural to a case study that the development target is refined as the research process progresses. (Ojasalo et al., 2015, pp. 52–54.) The results of a case study may help to understand special features, processes or mechanisms that are related to the studied phenomenon. This is mentioned to be a strength for case study; it could be that special features would not be seen if the number of studied phenomena gets big. (Hakala, 2024, section Tapaustutkimus.) Sometimes the value of a case study is questioned because a study of a single event is mentioned to be a disadvantage. In addition, the fact that it is difficult for other researchers to cross-check the information is considered as a disadvantage. (Bell et al., 2024, p. 39.)

Definition of a case study is such that it examines a phenomenon in its natural setting, utilising multiple sources of information, with the aim to relate theory to the empirical world. A common feature for a case study is that there is a wealth of material. It is also a flexible and adaptable research strategy. (Piekkari & Welch, 2020, pp. 207, 210.)

The intention of the development work is providing an in-depth understanding of the research topic to facilitate further development. As the purpose of the case study is generating new development proposals, the research strategy fits to this development work. In addition, the case study is suitable as a research strategy for this development work because it enables the exploration of “how” questions, which is the focus of the research question in this work. Ojasalo et al. (2015, p. 53) mention that case studies are suitable for research on poorly understood situations and behaviours and atypical processes. The poorly understood situation also justifies the choice of research strategy. The fact that a case study often starts from the studied case and not necessarily from theories also justifies the choice of a case study for the development work.

3.2 Qualitative research

In general, the less that is known about the studied phenomenon, the more likely it is that a qualitative approach will be adopted. Qualitative research is also suitable in situations where a thorough understanding or comprehensive description of a phenomenon is desired. (Kananen, 2015, pp. 70–71.) The aim of the research is therefore to understand the studied phenomenon through the subjective perspective of the people under study. Qualitative research is characterised by an attempt to produce as detailed information as possible about the phenomenon and to obtain it from people in their natural environment. It is mentioned to be one of the strengths for qualitative research that data collection happens in natural environment where participants can express themselves freely with their own wording. (Cardano, 2020, p. 63.)

Puusa & Juuti (2020, pp. 9, 11, 77) emphasise that a qualitative approach suits for studying occurrences of the kind that are based on awareness, human interaction and the language associated with it. According to Kananen (2015, p. 71), a full understanding of different processes also requires a verbal, qualitative, description of the phenomenon. In qualitative research the material consists of different texts, and the goals are expressed as descriptive rather than by means of hypothesis. Bell et al. (2024, p. 36) mention one of the advantages of qualitative research being the ability to change the focus of the study during the process if it's seen necessary. Qualitative research can also be used to identify such concepts which are difficult to quantify. Mentioned disadvantages are for example qualitative research being complicated and time-consuming. The results of the research cannot be tested and generalised. In qualitative research there is also the risk that researcher affects the results.

The development work will follow qualitative data collection methods. Because the purpose is to gain as deep as possible understanding of the functionality of the process interfaces, qualitative data collection methods fit for this work. By Puusa & Juuti (2020, p. 9) mentioned interest of person's thoughts, experiences and meanings which people give to the studied phenomenon fits for this development work. Furthermore, the research methods associated with

qualitative research support the choice, as the research problem needs a descriptive answer.

3.3 Research methods

Research methods are rules, means or procedures used to solve a research problem. To enable the researcher to choose the methods needed, the problem must be well known. The aim is to produce reliable information on which to base a solution. In qualitative research, the collection of data becomes cyclical because the research phenomenon is not known and therefore it is not possible to determine in advance all the needed data. The data is collected for as long and as much as it takes to solve the problem. The point of saturation determines when there is enough data. This is why in qualitative research one might face the problem of having diverse and plentiful data. (Kananen, 2015, pp. 65, 69–70, 128–129.)

Vuori (2021b, section Aineiston tuottaminen) prefers to talk about producing data rather than collecting or acquiring it, because the researcher is actively working to form data for the study. The most common research methods in qualitative research are questionnaires, various types of interviews, observation and data based on different types of documents (Tuomi & Sarajärvi, 2018, p. 71).

3.3.1 Interview

Numerous types of interviews are the most used data collection methods. An interview can be thought of as a conversation with a goal. It is good to remember that when an interview is interactive, its participants may influence each other. (Puusa, 2020, p. 103.) The extensive use of different types of interviews in case studies is probably because the research strategy is linked to the study of people’s behaviour in varying situations, and the participants in the situations can describe and explain the phenomenon under study (Ojasalo et al., 2015, p. 55).

The aim of the interview is to be able to make trustworthy interpretations based on the collected data about the studied phenomenon. The data generated by the interviews are the subjective beliefs, perspectives, opinions and experiences of the interviewees on the issues discussed in the interview. The researcher's analysis of all the experiences and perceptions is in turn his/her own interpretation of them. Moreover, the interview data is context-specific, so its generalisation should not be exaggerated. Interviewing is often the only way to collect data on the meanings and interpretations that people have given to things. (Puusa, 2020, pp. 103–104.)

A purposive and discretionary sample of interview means selecting to interview people who are known to have experience of the studied phenomenon. An interview is very flexible method, as it allows the researcher to focus the data collection on a way that is relevant to the research questions. Another advantage of the interview is that the interviewer may ask the interviewees for clarification or explanation on their answers. (Puusa, 2020, pp. 106–107.)

The interview setting is to be thought in advance. The place should be such where there is no noise that affects the recording and disturbs the interview. (Bell et al., 2024, p. 247.) The interviewees also need to feel good in the venue. Privacy must be guaranteed. If there are other people hearing the discussion or it is possible that somebody enters the interviewing space, it may create tensions for the interview and possibly even affect what is discussed. (Saunders et al., 2023, p. 462.)

There are three types of interviews: open, semi-structured and structured. Open interview is close to people just having a conversation, only with the difference that the other party being a researcher has a goal for the study when discussing. Structured interview means there are predefined questions, and they are often in a shape of a form. Semi-structured interviews are located in between of these two. (Hakanen, 2024, section Haastattelu.)

Often in the semi-structured interview the interviewer has a list of questions or topics that are needed to cover but there are no rules how and when the questions are played. Semi-structured interviews allow more space for the participants to tell their own interpretations on the studied phenomenon than structured interviews. Yet they offer the same topics, so it is possible for the researcher to compare the results from different interviews. (Saunders et al., 2023, pp. 443–444.)

For this development work a semi-structured interview will be applied. Because the researcher is rather unexperienced as an interviewer, for gaining the wanted answers it is better that the questions are listed in advance, and the order of themes is preplanned. The purpose for choosing the semi-structured interview is to give the interviewees possibility to express themselves with their own words as this is seen crucial for the success of the research.

Key persons will be interviewed for the development work. This means process owners and other people working in the processes, especially in the interfaces. People from studied processes with different working roles will be selected to be interviewed. They will be interviewed until saturation is reached in the answers. In case the saturation is not reached with the persons working on the studied processes, the interviews will go on to the management level. The interviews will take place in the office of ALA or in Teams.

In the development work the interview questions will handle firstly the background of the interviewee, to understand his/her role in the company. The questions will be formed on the themes like process elements, how the processes are working now and what might be the reasons for current performance, i.e. interviewee’s experience on the process status. Also, opinions on what would need to change for the performance to be better from the current situation will be asked. Evaluating and measuring of processes as well as evaluating existing KPIs’ relevancy will be included in the interview questions. In addition, it is asked to estimate the functionality of interfaces with numerical scale to gain the information how the interfaces in average work.

3.3.2 Document analysis

Document analysis is a method that attempts to draw conclusions from written data, and its' aim is to create an understandable picture of the subject under study (Ojasalo et al., 2015, p. 136). It depends on the research objects and the research problem what the researcher looks for in the documents. Documents may show how information has changed and evolved over time and how certain issues are linked to each other. Documents can help the researcher to understand the larger context as they may show something that is otherwise not visible. (Biddix, 2018, p. 118.) However, there are problems with using documents in research. The researcher should remember that document always has a purpose. Therefore, it would be good idea to verify information from documents with other sources to make the interpretation more reliable. In the case of documents, it is worth bearing in mind who wrote the document and why, who it was written for, when it was written and what was intended to achieve. Often, what is missing from a document, may be more important than what it contains. (Kananen, 2015, p. 158.) Bell et al. (2024, pp. 182–183) call this external and internal criticism, whereas external criticism is about if the document is factual and authentic, and internal criticism exposes the document to strict analysis with several questions, similar as mentioned by Kananen.

A method called content analysis can be used to analyse documents in a systematic and objective way. The analysis pursues for summarised description of document content in verbal form. (Tuomi & Sarajärvi, 2018, pp. 117, 119.) Content analysis helps to organise the data in a clear way and aims to add value to the information. Data processing is based on interpretation, in which existing material is broken down into parts, abstracted, i.e. conceptualised, and then reassembled into a logical combination. (Ojasalo et al., 2015, pp. 136–137.) The chosen sampling method needs to be repeatable and justified. In addition, the sample needs to be large enough to draw qualified conclusions. (Bell et al., 2024, p. 181.)

Document analysis will be used in this development work. The subject of the research is such that document analysis can provide additional information

about the studied phenomenon. By studying already existing process descriptions, flow charts and instructions, a better idea how these documents should be written in the future and how they can help with the research problem can be achieved. By comparing quality documents from different eras, it may be possible to see in which direction the documents should be developed in the future. To understand the interfaces between processes, it may be helpful to analyse the information the documents provide to solve the research problem.

4 QUALITY — DEFINITION AND PRACTICES

The benefits of quality are competitiveness and cost efficiency. Better quality leads to better cost efficiency. High quality provided for customer leads almost always to lower costs as doing things right for the first time makes the customer satisfied and operating costs lower. (Tuominen, 2016, pp. 48–50.)

4.1 What is quality?

The word “quality” stems from Latin word “qualitas” which means “of what” (Bergman et al., 2022, p. 29). There are numerous definitions of quality existing because quality stands for different things to different people on different occasions (Laman, 2022, p. 40). One definition comes from Dr. Deming who is considered to be best-known quality expert in the United States, especially having affected on the rise of post-war Japanese industry (The Deming Institute, n.d.). His definition for quality is “quality should be aimed at the needs of the customer, present and future”. Deming was one of the first to define the concept and take into consideration the customers of tomorrow. However, when defining quality, it is important to take into account also the side of producers and providers. There has to exist a general basis for the decisions made in the organisations, for example during manufacturing. But in the end, it is the customer who decides if the experience of the product or service is successful. (Bergman et al., 2022, pp. 29–30.) Karjalainen & Karjalainen (2020, p. 21) say quality is not gotten as a gift, but it is free of charge. Instead, variation and not making things correct in the first time, costs.

Tricker (2020, p. 24) indicates that quality is based on client satisfaction. According to Grönroos (2020, section Asiakkaat kokevat laadun) quality is anything what customers experience it to be. Emeje et al. (2019, section Introduction) point out that quality of a product or service is ensured only in the case when the quality is manufactured into the product or service, rather than waiting for the outcome to check the quality. Angle (2019, p. 10) as well emphasises the impact of quality in many areas before actual manufacturing, such as

design and sales. In the figure 3 is seen the issues through which high quality can add profitability. The words external and internal quality in this figure refer to external and internal customers.

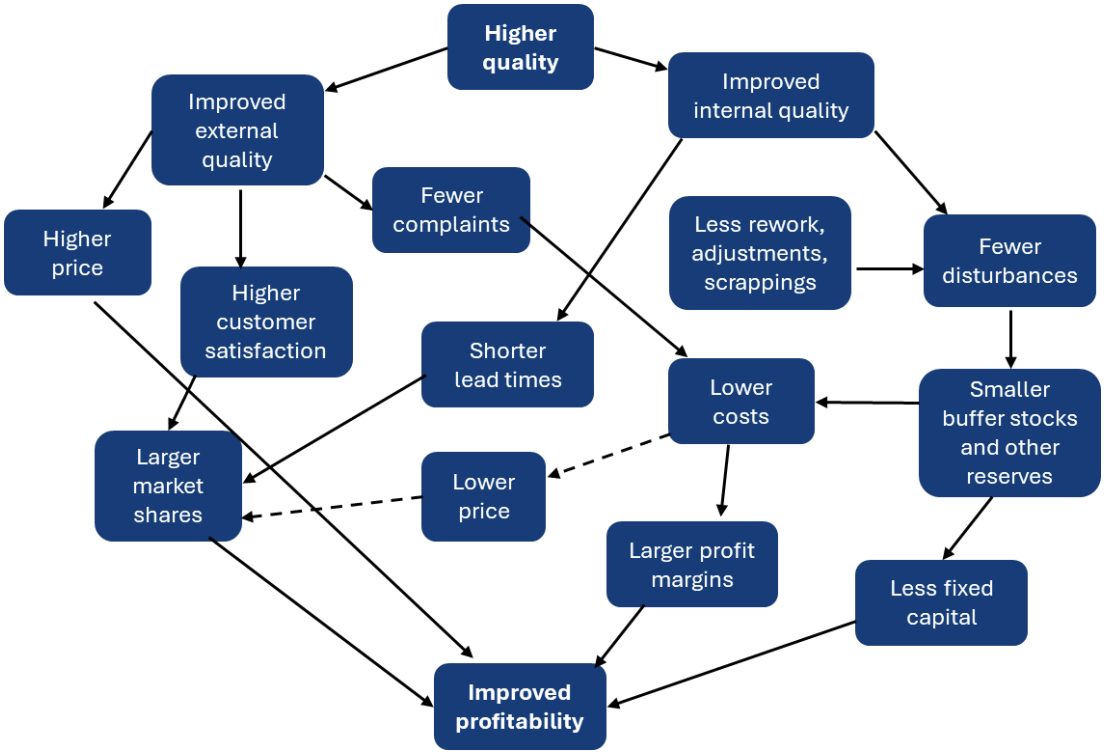

Figure 3. The impact of high quality to enhanced profitability (adapted from Bergman et al., 2022, p. 50)

Ingason (2020, pp. 18-19) likes to handle quality with two aspects from which both customers have expectations; one is the attributes of product or service, and the other one is about providing them without failings. When it comes to a product, quality may indicate reliability, durability, functionality, and other technological aspects. Concerning services, the aspects can be functionality, accuracy, knowledge and service, for example. Failings have to do with factual delivery of a product or service, does the delivery happen according to specifications and without mistakes. Slack & Brandon-Jones (2021, pp. 458–459) incorporate in their quality description quality as specification, i.e. what the product or service can do and quality as conformance, i.e. that it does what it is supposed to do, without errors.

Garvin defines five aspects on quality: transcendent, product-based, user-based, manufacturing-based and value-based. With transcendent perspective he means that quality is something that cannot be securely defined because it can be identified only when experienced. The product-based aspect means quite the opposite; quality is something that can be accurately measured, and it holds specific desired characteristics. This leads to the thinking that higher quality is always more expensive, and the end client cannot judge the quality. As to the user-based outlook, the quality is determined only by the customers, and it is about fulfilling their needs and expectations. In the manufacturing-based perspective quality means meeting the requirements and standards in production. In value-based perspective quality is determined with respect to cost and price. Garvin is of the opinion that an organisation should consider all approaches to the quality concept in their operation. (Garvin, 1984, as cited in Bergman et al., 2022, p. 32.) Bergman et al. (2022, p. 33) like to add to the definition of quality the aspect that customer needs should preferably be exceeded, i.e. fulfil such needs the customer wasn't aware of.

Angle (2019, p. 37) states quality is a behaviour and from that point of view quality has to do with everything. Tuominen (2016, p. 53) divides quality into four elements; external quality into product and service quality and internal quality into process and organisational quality. Product quality has to do with product performance, reliability, durability and aesthetics. Service quality on its side is the quality of customer experiences in different phases of the service, such as quotation time and accuracy, delivery time and reliability, installation support, speed of service and support in product use. The importance of process quality comes from the thinking that quality cannot be developed for the customer as such, but it is done by improving organisation's operation. The quality of the organisation is all the knowledge and skills the individuals in the organisation have and the ability to utilise them. (Tuominen, 2016, pp. 54–59.)

4.2 People make quality culture

Durable quality culture is driven by top management, and it is also supported by it. It is crucial to make all employees responsible for quality performance. (Angle, 2019, p. 19.) Every employee's contribution affects the quality organisation produces, customer satisfaction and efficiency. The entity of all those issues can be called organisation's quality culture. External control certainly has its purpose but for the total outcome it is better to join as many quality-related actions into everyday operational work as possible. Highlighting the importance of quality and bringing quality related issues to the front are important parts of quality culture. (Lindroos, 2022.)

High quality may be a remarkable advantage for an organisation compared to competitors (Slack & Brandon-Jones, 2021, p. 454). Quality needs the right product designs, manufacturing systems and operating principles to be high. All of those are developed by people. This leads to the thinking that quality and its development are mainly showing learning results. Hence quality development can be seen as the development of people's quality. (Tuominen, 2016, p. 75.)

Quality should be an issue for each individual in an organisation. People are the origin of both good and bad quality. This tells that as everybody can affect quality, everyone can also improve the quality. It can be done by improving the way of working and helping others to improve their way of performing the job. (Slack & Brandon-Jones, 2021, p. 461.)

4.3 Quality management systems

Nowadays quality management means more than only avoiding errors as it is considered to be an approach to managing processes and improving them. Quality management has the focus on the most essential issues in the business, which are providing the products and services wanted by the market. (Slack & Brandon-Jones, 2021, p. 455.)

As every organisation has its own way of managing the business, for example recruiting or financing, quality needs to be managed as well. The management system contains the tasks, responsibilities and resources the organisation has and, at least in bigger organisations, it is also documented. The quality management system focuses on constant improvement of the business to meet changing customer expectations, and simultaneously the needs of stakeholders. (Bergman et al., 2022, p. 540.) A quality management system is a set of guidelines where it is defined how processes in the company are to be performed by the standards to reach qualitative output. In this context, it is not about the cost of process efficiency but only about the process being followed in accordance with documented procedures. (Angle, 2019, p. 19.) Quality management system is a system that includes all the things that are used for regulating, controlling and improving the quality of the organisation (Tricker, 2020, p. 34). Using a quality management system to improve total performance is organisation's strategic decision (ISO 9001:2015, 2015, p. 43).

Quality management has all the time been a very important part of operation management even when its role has changed little with time. Ever more quality management is seen as something that plays a part in operational improvement. For many organisations quality management is the main aspect when making improvements. (Slack et al., 2022, p. 585.) Kamensky (2015, p. 158) is of different opinion; as quality management became a widely known concept after World War II, it has now come to the end of its journey as a leading point in management. Sarasohn (2019, p. 16) on the other hand says it has been proved by many companies that if a company wants to be successful, there cannot be any doubt that quality is the most essential base for it.

Quality management is one of the most controversial topics in operations management and mainly it has to do with the people-aspect in quality management. It is said it is not easily possible for employees to influence on the organisation's direction as much as is suggested in the theory of total quality management. What comes to ISO 9000 standards, not all authorities see the standards as beneficial because they are expensive, demand a lot of time to maintain the

registration, and they are too formal. (Slack & Brandon-Jones, 2021, pp. 475–476.)

Even when ISO 9001 is the most utilised standard as quality management system, also other standards and frameworks exist. This is due to industries having specific requirements and different kind of challenges. Some of the standards and frames are industry-specific and some target to cover several fields. Examples of such standards are IATF 16949 for automotive industry, AS9100 for aerospace industry, ISO 13485 for manufacturing medical devices and API Q1/Q2 for oil and gas sector. (Malikov, 2025.) Other frameworks for quality management system are such as Six Sigma, which was built on tried and tested elements of total quality management, and The European foundation for quality management excellence model (EFQM), which is an informal system to help organisations to drive their development and excellence (Kadry, 2018, pp. 3, 83). In this development work only quality management systems ISO 9001 and total quality management are described more in detail. They are presented due to commonness and to P&O following ISO 9001.

4.3.1 ISO 9001:2015 standard as quality management system

The end clients of today are not just expecting to receive products and services of quality, but they also want proof that the organisation is constantly able to deliver good quality. Such proof normally means that an independent party is needed to declare the state of quality. Until the 1980s, this was not possible. As the demand for quality assurance during all production phases rose, ISO standards were introduced. Nowadays the standard is in use all over the world among manufacturers, suppliers and end clients. (Tricker, 2020, p. 25.) In Europe, ISO 9000 certification has become a desirable requirement for business (Tuominen, 2016, p. 72). Standard ISO 9001 defines the demands whose purpose is to add customer’s trust in the products and services and hence improve customer satisfaction. When the standard is correctly utilised, it is expected to bring also other benefits for the organisation, such as better understanding and control of the processes. (ISO 9001:2015, 2015, p. 72.)

The International Organization for Standardization (ISO) consists of national standard associations around the world. ISO 9000 is a series of standards that has a focus on the organisation management and ISO 9001 sets general requirements for organisation's quality management system. ISO 9001 is based on primary principles of quality management, such as focusing on customer, engaging of personnel to quality, process approach in the company, continuous improvement to react to changing circumstances and making decisions based on evidence. (Ingason, 2020, pp. 54–57.) These issues are described in figure 4.

Figure 4. Basic values for quality management system (adapted from Bergman et al., 2022, p. 60)

The basic objective of ISO 9001 is quality assurance; to convince the customers that their expectations will be met. Some of the basic requirements mentioned in the standard are that an organisation has a quality policy, processes are standardised and utilised systematically, defects are controlled, there are systems to correct failures, and the systems are constantly studied to ensure they are relevant for the organisation. (Ingason, 2020, pp. 54–57.)

Standard ISO 9001 has a process approach to quality management system. Once an organisation understands and manages the system formed by processes, the efficiency of the organisation will improve, and it is possible for it

to gain the results wanted. When a quality management system utilises a process approach, it can understand demands and fulfil them, evaluate processes based on their added value, improve processes by analysing data and gain impressive process performance. (ISO 9001:2015, 2015, p. 44.)

According to users of ISO 9001 standard, the standard helps to connect quality management to strategy and operation planning, adds management commitment, gets personnel interested in developing quality, improves competitiveness, produces products and services that meet customer requirements now and tomorrow, improves customer satisfaction and increases reliability of the operation (SFS, n.d.). Slack & Brandon-Jones (2021, p. 473) bring up that ISO 9000 is the best-known quality system but according to Fleischmann et al. (2020, p. 36), compared to total quality management, ISO 9001 standard is the weaker form of quality management.

4.3.2 Total quality management as quality management system

Bergman et al. (2022, p. 58) define total quality management as follows: “A constant endeavour to fulfil, and preferably exceed, customer needs and expectations in a sustainable and cost-effective way, by continuous improvement work, to which all involved are committed, focusing on the processes in the organisation and their customers”. Laman (2022, p. 265) says the target of total quality management is to manage quality improvement procedures through the whole organisation. Total quality management means systematic procedures which aim quality improvements to be part of organisation’s operation and to ensure that both internal and external clients are satisfied. Total quality management cannot be seen as a separate tool but rather as a whole because it is extremely long-term and comprehensive. (Luoma, 2025, p. 261.)

Good principles of total quality management are the following:

- Customer on focus; to know the customers now and in the future, know their expectations and try to exceed them.
- Decision-making based on facts; utilising the facts that are known.

- Focus on processes; studying processes gives the organisation a way to improve working.
- Continuous improvement; any organisation that wants to survive needs endlessly to improve the quality.
- Letting everyone take an active part; in total quality management it's important for employees to be committed.
- Committed leadership developed; clear and committed leadership is the foundation for quality improvements. (Bergman et al., 2022, pp. 60–72.)

Total quality management is a matter of proactively discovering ways of delighting customers. It combines values and tools to achieve high satisfaction within end clients with less resource consumption, and it needs to be based on top management's commitment to quality matters. (Bergman et al., 2022, pp. 59–60.) For total quality management to be efficient, it needs organisation's management to be fully committed, focused and goal-directed (Emeje et al., 2019, section Introduction). Laman (2022, p. 265) highlights the authorisation of the personnel; each employee must realise that continuing improvement belongs to everybody's tasks.

4.4 Controlling quality

As the name implies, quality control's task is to control quality. Mainly this happens through inspections and testing. The American Society for Quality defines the term as being observation techniques and activities which are used to fulfil quality requirements. (Angle, 2019, p. 27.) Quality control mainly aims at preventing errors in production (Tricker, 2020, p. 28). A quality control system is established to help the organisation maintain the promises it made to the customers and to convince other interest groups of the organisation being able to deliver products that fulfil the requirements set (Tuominen & Moisio, 2021, p. 25).

In the production process, quality control is used to reduce variation in the quality of products. It involves everybody in the process starting from the manufacturing department as there needs to exist a good understanding of what is expected by all means: personnel, material, equipment, delivery time and so on. The process of quality control goes on until the products are shipped. Quality control provides management tools to interfere when the quality of production is about to fall into disorder. It is important not only to avoid the build-up of defects, but the purpose of quality control is also to try not to lose the customer's trust in products. Sometimes quality control shows that for the manufacturing process to operate efficiently; the whole process needs to be changed. To convince the management to do this, quality control offers evidence of process variation and indicates the places where the change is most needed. The meaning of statistical quality control in a manufacturing process is not to know the quality of each product but to know without delay when the quality starts to diverge from the standard followed. (Sarasohn, 2019, pp. 73–75.)

4.5 Quality in the development work

Quality documentation will be analysed in this development work. It is vital to understand what quality consists of to be able to make correct interpretations of the documentation. To understand processes and their interfaces as detailed as possible, it's needed to understand how quality builds up. In the organisation there are defined quality requirements for the whole supply chain and that means the requirements will also cross the process interfaces. As the objective of the development work is to give proposals for developing processes, quality management is needed as background information.

As P&O follows the ISO 9001 quality standard, it needs to be ensured that the processes and their interfaces are build according to the standard requirements when developing them. The research will form an understanding of how the processes manage to do what they are supposed to do and therefore it needs the definition of quality in the expectations of internal suppliers and

customers. As quality means different things to different people in different occasions, it will be found out how the people working on the studied processes and their interfaces see the quality. Based on how the interviewees see quality in their work, it can be concluded what kind of actions need to be taken in case problems occur in the process performance and process interfaces.

5 UNDERSTANDING PROCESSES

Process-centric method is part of quality management philosophies as it is better to have focus on the processes inside of the organisation rather than on outcomes only (Piñerez Díaz et al., 2025). Processes are everywhere because they are the foundation for all operations, and they influence the operation's performance (Slack & Brandon-Jones, 2021, p. 161). Process is a chain of activities that will turn inputs, which are resources, into outputs, i.e. products or services. The purpose of a process is to deliver the wanted output. The resources needed for a working process can be, for example, material, labour, premises, financial capital and energy. A process is more productive the less it needs inputs to convert them into desired outputs. While working, the process might also produce emissions, scrap and waste and therefore not turn all inputs into outputs. (Holweg et al., 2018, pp. 31–34.) A process is triggered by an event, either internal or external; for example, a customer order to which a company must react in a coordinated manner. There are no companies without processes, but different processes can play the role of different significance levels to companies, for example depending on the type of business. (Fleischmann et al., 2020, p. 1.) How process works is represented in figure 5.

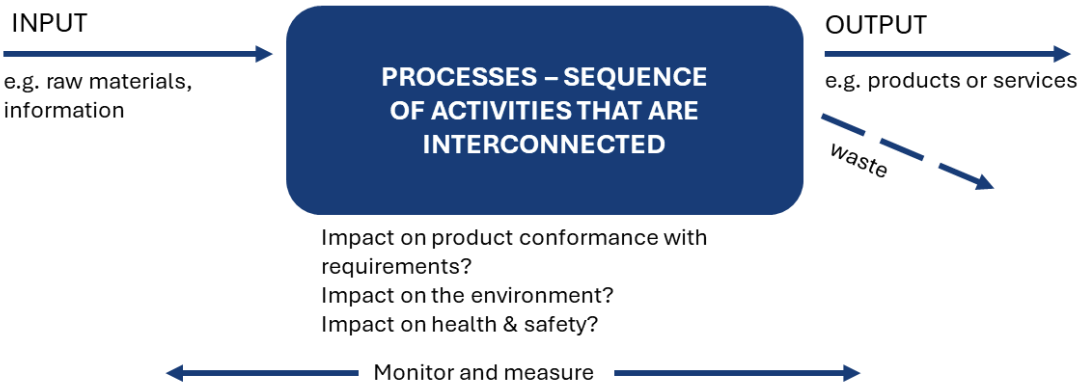

Figure 5. Operation of process (adapted from Ingason, 2020, p. 105)

Holweg et al. (2018, p. 7) like to divide the theory of processes into three parts: design, measurement and improvement. Design means basically understanding how processes work, what their strengths and weaknesses are, and how

to design a process for a certain purpose. Measurement is specified as knowledge about process performance and what to measure in it, plus possibility to affect the performance. Improvement is about how a process can give more: higher quality, shorter times in supply, and more productiveness. (Holweg et al., 2018, p. 7.)

Fleischmann et al. (2020, pp. 3–6) divide the description of process into three, process strategy, process logic and process implementation. The process strategy says all the purposes, triggers, inputs and outputs a process has. In the flow of the process, it creates a value for which the customer pays. With process logic, they mean the internal perspective of a process, which describes all related actors and their interaction. Process implementation is the aspect of equipping the process with needed resources, such as humans, machines and software systems.

It is relatively easy to describe how a process works mechanically but the fact, that processes are working in real life by relying on both machines and humans as resources, needs to be considered. Those have to be taken into account separately and their interaction has to be noted. The operation of a factory, for example, is a combination of different kinds of processes: manufacturing, service and a set of superior processes. (Holweg et al., 2018, p. 37.) Processes define how information and work proceed in organisation structures (Ikonen et al., 2023, p. 39).

The more clearly an organisation has specified its processes and the more coherently it executes them in the daily operation, the more efficient the organisation will become. This is due to the fact that the process' target is to improve the productivity of an organisation in all aspects, i.e. customer satisfaction, employee inspiration and the coalescence of partners. Nowadays for many organisations to be successful, it is no longer about the uniqueness of their products or services, but about the quality of their processes. (Fleischmann et al., 2020, pp. 2, 30.)

To follow the ISO 9001 standard, an organisation needs to define its quality management processes and the usage of them in the entire organisation. There is to be defined required inputs and expected outputs, the order and interaction of processes, methods for monitoring, measuring and to them related performance indicators, resources and their availability, responsibilities and authorities, risks and opportunities plus evaluation of the processes and implementing of needed changes. In addition, the standard says that an organisation needs to maintain documentation that supports the function of processes. (ISO 9001:2015, 2015, p. 49.)

Process management is seen to be suitable in some way for any organisation. Especially it is useful for organisations which emphasise the cooperation of units inside of the company, general efficiency and personnel's initiative. To be able to take the best out of process management, the organisation must be willing to process data in numerical form. Process management itself also produces data, which can be used to recognise the current status and targets of the organisation. (Luoma, 2025, pp. 279–282.)

5.1 Process interfaces

Processes go across the departments in an organisation. In addition, processes go across the companies in a value chain when transforming raw materials into finished products. Furthermore, processes form webs of processes that interrelate with each other. For example, manufacturing process needs human resource process, finance process, purchase process and at the end delivery process. In the interfaces of processes there might exist different perspectives on issues and therefore people working on the interfaces can create innovations which could not be invented among persons working only on one process and not having to face persons from other processes. The processes don't operate in isolation but have several stakeholders like suppliers, customers, authorities and competitors. (Holweg et al., 2018, pp. 38, 193.)

According to Slack & Brandon-Jones (2021, p. 196), the processes should already be designed with the idea that they are connected to other processes, otherwise it is difficult to make process networks productive. When processes are put into operation, it is essential also to establish links with other processes. In an organisation processes are usually integrated into a process network and no process should be in isolation. The ways to link processes can be, for example, by exchanging messages about process performance, when a new process is added, or when an existing process is modified. Another way to link is sharing data. (Fleischmann et al., 2020, pp. 236–237.) When people understand how a process fits the internal network, it is easier to set the objectives for the process. If it is not understood how process chains interact, it can decrease the efficiency of the whole operation. (Slack & Brandon-Jones, 2021, p. 196.)

If in a company single functions are optimised, it might lead to the situation where the expertise in that function will get isolated. This does not lead to an overall benefit for the company. Processes are connected to the system they belong to, and they create value chains together with other functions. Therefore, it is important to take into consideration also the surroundings of the processes, not only the processes themselves. (Holweg et al., 2018, p. 194.)

Because all processes are affected by other processes and in turn, they affect other processes, every part of organisation can be considered as an internal customer and supplier. Due to this chain, errors will eventually affect external customers. Therefore, it can be said that the best way to keep external customers content is to satisfy the internal customers. Due to this, each process needs to be responsible for managing its internal customer-supplier relationships. (Slack& Brandon-Jones, 2021, p. 460.)

When describing processes, the work is good to start by defining process boundaries. The interfaces to other processes would be good to define so that dividing responsibility among people is easy. It is to be remembered that dividing doesn’t necessarily follow the department boundaries. (Tuominen, 2021, p. 50.) Arter (2020, p. 11) emphasises the interaction between processes when

mapping them. The organisation should be thought of as a system which has common goals and thus the processes should be developed as a whole. The system is equally strong as its weakest connection. When planning process flow diagrams, understanding customer's journey through the organisation helps to pay attention to process interfaces and prevent them from siloing.

The interfaces may be in a key position when there are big changes made in the structure of an organisation. Big changes can break the links between different parts of the organisation, and this causes cooperation and fluent process work to get complicated. (Ritakallio & Vuori, 2018, p. 102.)

5.2 Process analysis for mapping

The best way to start mapping processes is to take a look at the organisation's operation from a distance and ask oneself questions about the activities and customers (Ingason, 2020, p. 103). To have the best benefits of processes, organisation needs to analyse them at two levels: the "as-is" level and the "wanted" level. The only way to improve the process is to know how it is working now, the "as-is" level. In mapping it is crucial that the process is described honestly as it is and not like people think it is or want it to be. The other considerable issue is choosing the accuracy needed for the process flow diagram. Mostly it is more helpful when not all the details are shown but the map is constructed on a level of vital aspects. It is useful to involve personnel working with the process for mapping as they may have such information about the process' problems and features which management doesn't have. (Holweg et al., 2018, pp. 61–62.) An example of simple flow diagram with commonly used symbols is shown in figure 6.

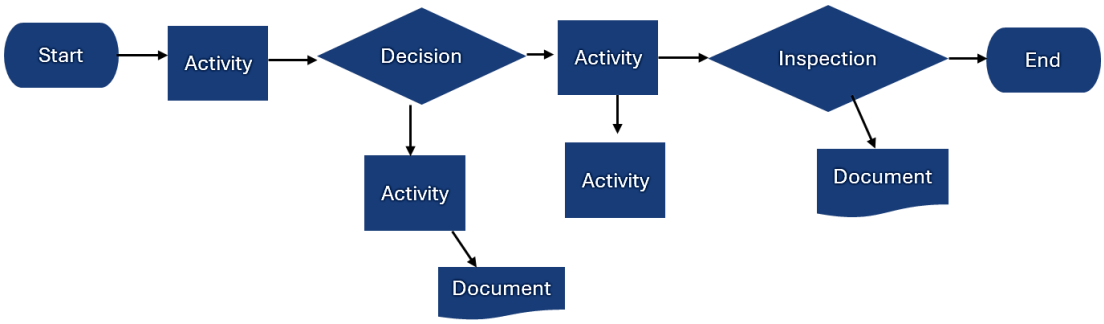

Figure 6. Example of simple flow diagram (adapted from Bergman et al., 2022, p. 391)

To know what happens with the “as-is” process, the best way is to make a flow diagram. There are several different kinds of diagrams existing, and it should be considered case by case which one serves the purpose in question best. (Holweg et al., 2018, pp. 62–63.) Mapping, despite its technique, describes the activities that happen during the process. In addition, it contains the flow of materials, people and information, separately or together, through the process. (Slack & Brandon-Jones, 2021, p. 202.)

Fleischmann et al. (2020, p. 225) list the features of a good process documentation to include among others the following:

- Launcher and goal for the process
- Input
- Output
- Area of process’ validity
- Explanation on abbreviations and terms
- Verbal description of process
- List of technical tools needed in the process
- Feedback system
- Exceptions to the common process procedure
- Interfaces to other processes
- Performance indicators and measurements
- Reportage.

The benefits of flow charts when describing processes are various. The employees who participate in the process description recognise their part in the process and see how their work affects others and also get an idea about the tasks other people do. This usually strengthens cooperation. When it is seen in writing that an output has a customer, it generates the need to find out the expectations the customer has. The flow chart encourages people to try to improve their work and develop quality. (Tuominen, 2021, p. 52.)

5.3 Controlling processes

To control a process means it needs to be measured before, during and after its operation. In case the performance of a process is not measured before the operation, it doesn't give any value to measure it after the operation either as there is no starting point to compare to. The baseline to improve any operation is to measure outcomes continuously. (Holweg et al., 2018, p. 35.) The implementation of processes needs to be measured all the time through analyses of key performance indicators, and other metrics in order to be able to improve in case of deviations (Fleischmann et al., 2020, p. 37).

Perhaps the most important metric to investigate process efficiency is the time it takes for material or information to go through the process, from beginning to the end. Throughput time, also known as production rate, is the most common metric. In case there is no technical reason for throughput time to be long, it implies that something is not correct in the process. It is considered to be a theoretical production rate as in reality anything can happen; material jams, poor quality or breakdowns, bottlenecks may exist or fixing the process needs management interference. One of the most powerful ways to improve process productivity is reducing throughput time. There are also other time-related metrics for processes. Cycle time is the rate of process production. Processing time, also known as time for the operations, is the total time needed for fabricating a unit. Waiting time is the time spent with incomplete work before the process can start. Lead time sees the metrics from customer's perspective as it defines the time from customer order to the delivery of product or service.

Takt time is the rate at which the process has to deliver to come up to customer's expectations. (Holweg et al., 2018, pp. 74–75; Carvalho, 2022, pp. 120–121.)

In the variation of the process, interesting variations are related to quality, quantities and timing. The most important quality metrics are customer complaints, scrap, rework and warranty costs. In quantities these are stock-keeping units, production plan variation, deviations and inventories. Variation in timing can cause more problems than the ones mentioned before. In timing important metrics are degree of expediting, time from order to delivery and extent of backlogs. (Holweg et al., 2018, pp. 152–154.)

The following are changes in process design, which might help with optimising the processes to reach positive behavioural changes in them.

1. **Parallelism and overlapping execution.** Independent activities can be performed completely or partly simultaneously, maybe even by different task holders, to accelerate the process.
2. **Aggregating activities.** Activities which were previously executed separately are grouped to reduce dividing labour and process interfaces.
3. **Changing the sequence.** If the second activity depends on the result of the first, the activities should not be performed simultaneously in order to save time, capacity and cost.
4. **Elimination of activities.** Discussions, simulations and analysing the process may reveal activities that are not needed or nearly never used, or which add no value to the operation.
5. **Elimination or reduction of cycles.** To speed up the lead time of process, cycles of activities can be identified, located and maybe eliminated by changing the process design.
6. **Insourcing and outsourcing.** Sometimes it is profitable to hand over processes or parts of them to external service providers.
7. **Automating.** Especially for situations that are time-consuming and vulnerable to mistakes, it is worth considering if manual work can be automated.

8. **Reduction of interfaces.** Processes have interfaces on organisational and technical levels, and they involve various partners. It can lead to work duplication, transmission errors, extra costs and time loss. Through organisational changes, the interfaces can be reduced to tackle problems. (Fleischmann et al., 2020, pp. 250–251.)

As processes work in sociotechnical systems which consist of both machines and people, issues like motivation, inducements and rewards are equally important as cycle time and capacity in process improvements (Holweg et al., 2018, p. 186). This is an important issue to be remembered when performing process control. Some of the process improvement methods are difficult to be sustained and therefore the process performance may slide back to what it was before the improvement.

5.4 Theory of processes in the development work

The information from chapter “understanding processes” will be used in the development work for recognising the important issues for process development and interfaces’ function in P&O, as the objective of the research says. The theory of processes is needed in studying the process relationships, clients and other elements, as well as in creating development proposals for the organisation about improving process performance. In the development work the “as-is” and wanted levels of processes will be compared.

The distribution of process description into process strategy, process logic and process implementation by Fleischmann et al. (2020, pp. 3–6) helps to understand the structure of processes in the research. As P&O wants to reach operational excellence across the entire organisation, it is important to keep in mind not to isolate any functions by mistake when making the improvement work. In the organisation exist a lot of internal customer-supplier relationships. The theory provides knowledge about the features of them to be considered in the research.

The themes of process management will be utilised in forming the research questions to the interviewees. In addition, process flow diagrams and descriptions will be used in document analysis. The list of process changes for improving process behaviour introduced by Fleishmann et al. (2020, pp. 250–251) will be used by mirroring the research results against the list. This is to see if in the list mentioned actions could help in development in P&O. When the results of the research are ready, with the help of theory it will be checked that the performance metrics P&O is using are most suitable metrics according to the research results.

6 CONTINUOUS IMPROVEMENT

Continuous improvement is considered to be an important part of quality management. Implementing standard ISO 9001 is a strong way to ensure continuous improvement takes place in an organisation. Improvements can happen for example through evaluating and refining the processes. (Piñerez Díaz et al., 2025.)

When continuous improvement is wanted to be sustainable, it is essential to never be satisfied. One should never be satisfied with what is already achieved but to always seek to improve. It is also said that the ones who are satisfied will never make progress, but the dissatisfaction should be converted to improvements and not to complaints. (Carvalho, 2022, pp. 44–46.) The importance of continuous improvement is seen for example in it being the driving power in process work (Arter, 2020, p. 10). Many successful companies have flopped as the ability to renew has not been enough, thus adapting to new demands is crucial (Kamensky, 2015, p. 78).

To get the organisation to follow continuous improvement and not make random improvements here and there, is no easy task. Often it requires large structural changes and also changes in the attitude of the personnel. The improvement process needs to be visible in daily operation, in each process, and at all levels of the organisation for it to be efficient. Additionally, even when the targets have been met, improvement as a goal is maintained. Today continuous improvement cannot be seen only as an advantage compared to competitors but rather as a component for survival. Continuous improvement happens when everyone participates every day with small actions to improve things they can affect. It is important to share the awareness that there is always a way to do things better. The work to execute and maintain continuous improvement is massive and therefore it should be considered that it is not possible to follow the strategy without constant effort and attention. (Carvalho, 2022, pp. 154–155, 157.) In figure 7 are described the fields of knowledge that are needed for continuous improvement.

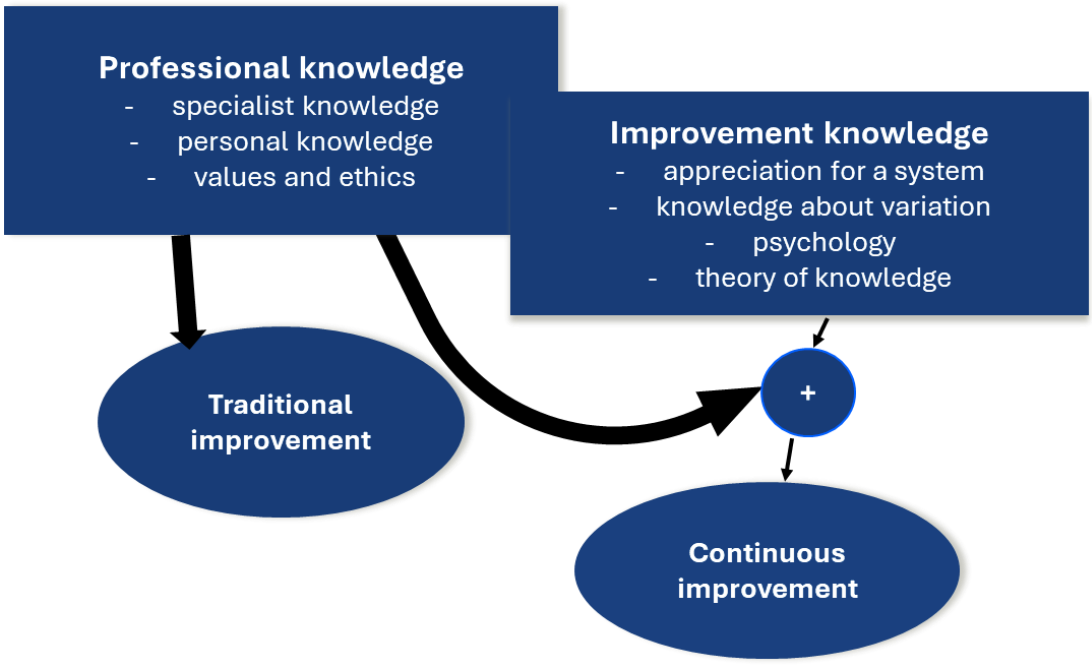

Figure 7. Fields of knowledge needed in continuous improvement (adapted from Bergman et al., 2022, p. 195)

There is no perfect recipe to manage improvement, but some issues seem to forecast the success of the improvement process. An improvement strategy could include the roles, responsibilities and available resources for the improvement of process, as well as the improvement philosophy in the organisation containing the expectations. A crucial issue for the improvement process to become a success is top-management support. It is important also to supervise the improvement process, but caution needs to be taken not to cause unnecessary bureaucracy with it. Training needs to be offered to the employees as it will give them the needed skills to implement the improvements. The employees will also gain an organisational understanding that exists behind the improvements through training, and this will help to make the improvement process fluent. (Slack & Brandon-Jones, 2021, pp. 443–446.)

Continuous improvement is also mentioned in the standard ISO 9001 (2015, p. 67) as it says organisation must improve the suitability, practicality and efficiency of the quality management system all the time. For continuous improvement to be able to use its' force for increasing competitiveness, the

organisation must know the direction it wants the improvement to go. It is also essential that the whole organisation is aware of the vision management has defined for continuous improvement. In addition, a system of work methods to follow the improvement needs to be created in the organisation and introduced to the personnel. (Carvalho, 2022, p. 145.)

6.1 Building reliable and relevant measuring system

Several issues say why measuring should be done. These are, for example, finding ways to develop, helping to set targets, understanding what happens and changes in the operating environment and helping to define reasons for faults. Measuring can also tell if the resources are used efficiently and if personnel need additional education. (Tuominen, 2021, p. 92.) It is important to remember that the only way to obtain good data for decision making is through usage of proper tools. The measuring equipment is to be kept in good shape, which means to maintain and periodically check it. (Russell, 2016, p. 24.)

It is useful to engage personnel in the measuring system's development work and train them. In making measuring an important activity of the operation, the management needs to show example with own behaviour and understand that the process of creating a measurement system is long-term. (Tuominen, 2021, p. 92.) The elements that a measurement system needs to include are the instruments themselves, standards for calibration, environmental influences, features of the measured object and the limitations occurring by the human operator (Laman, 2022, p. 205). An organisation should decide on a suitable number of metrics and frequency to measure. It is often useful to have five metrics in a measurement system. The system should measure 80% other than financial metrics. (Vuorinen & Huikkola, 2023, p. 56.)

The metrics can be classified according to different features, of which the most common being costs, time, quality and flexibility. An organisation which plans to develop a measure system could clarify metrics previously used in the organisation. It is also good to know what kind of metrics are generally

recommended by experts but to keep in mind that only by customising its own metrics the organisation can reach its targets. (Huuhka, 2022, section 11.1 Esimerkkejä mittareista.)

The metrics need to match the organisation's strategic goals, and they are to be reliable, valid and relevant. Relevance means that the results the metric gives are essentially important for the organisation. Relevance is based on the value the result gives for decision making or process control. Reliability means that the information the metric produces doesn't change from one time to another if no actual change has happened. Validity describes how well the metric used gives information about the wanted feature. It is also important to think about the costs of measuring. When the costs get too high, even if the information the result gives is important, it's not necessarily reasonable to perform such measurements. (Huuhka, 2022, section 11.3. Mittareiden valinta.) When the surroundings of an organisation change, it is to be kept in mind that the metrics need to be updated as well (Vuorinen & Huikkola, 2023, p. 343).

Herremans (2020, pp. 77–78) says good metrics are specific, measurable, achievable, relevant and timely. In this regard specific means that the action measured has a straight connection to the indicator. Measurable means that the data needed is relatively easy to collect or is already in some form collected. Achievable means the target behind the indicator is easily reachable. Relevant means that the aspect the indicator gives is essential for organisation operation. Timely stands for organisation to report the indicator often enough to be able to take corrective actions if needed.

6.1.1 Performance measurement

The reasons for monitoring performance are to gain better business and capacity planning and shorter times to solve problems (Mishra, 2024, section Need for monitoring). Performance measurement is needed to judge how the operation works. Performance measurement has three important issues: which factors should be included as performance metrics, which are the most

important metrics, and which detailed metrics to use. For deciding which performance metrics to use, the five most common performance goals are quality, speed, reliability, expense and flexibility. The important issue when defining performance indicators is to find a compromise between having only a few metrics which may not be detailed enough and having many detailed metrics which may be difficult to manage. This leads to the fact that the company's strategy needs to be well specified to be able to choose the correct kinds and amounts of performance indicators. Performance management includes all the actions which somehow affect performance. Performance metrics on their side tell where the improvement is needed. (Slack & Brandon-Jones, 2021, pp. 419–422.)

Naturally a performance measurement has quite little significance unless it is compared against any objective. The targets can be historically based, strategic, external performance-based or absolute targets. Maybe a company also wants to know how it performs against competitors' performance. Setting the targets is not so easy because different targets can give very different messages of the same performance, depending on which it is compared to. (Slack & Brandon-Jones, 2021, p. 423.)

Measuring performance can be approached from various viewpoints, depending on what is important for the improvement. Processes, total costs, knowledge of personnel, or customer satisfaction can be viewed. In the end, measuring the operation is the only reliable way to have information about performance in the areas vital to the organisation. With measurement results, better choices can be made. When performance is measured, a better understanding of the effects caused by changes in the organisation will be gained. The information can be distributed inside of the organisation and also to the stakeholders. (Huuhka, 2022, section 11 Suorituskyvyn mittaaminen.)

By choosing a couple of performance indicators to which everybody can affect and keeping them visible to all, management signals what is important in the organisation (Tuominen, 2021, p. 100). According to ISO 9001 (2015, p. 64)

organisation needs to define what is to be measured, with which methods it will gain proper results, when to measure and when to analyse the results.

6.1.2 Key performance indicators

The key performance indicators (KPIs) originate from business models and strategies, and they measure on the high level of an organisation. The KPIs' focus is on doing the right things whereas the focus for process indicators is doing the things right. (Fleischmann et al., 2020, p. 7.) Angle (2019, p. 83) mentions KPI to be often a financial metric that is used to measure company performance.

Parmenter's (2020, p. 49) definition for key performance indicator is that it tells the management how the organisation performs in current and future critical areas. In the case of KPI it is possible for the management to increase its performance. When a performance indicator is not with the word "key", it is only telling the management what different parts of the organisation are providing. (Parmenter, 2020, pp. 49, 51.) Key performance indicators may be defined by each production unit in an organisation but to work properly they always have to mirror organisation's vision and strategy. KPIs determine the decisions the operational units will make daily. (Carvalho, 2022, p. 119.)

A metric can be seen as a performance indicator which produces information on performance in the whole organisation. This information helps to improve the operation. (Sahay, 2016, p. 26.) KPIs are a bit more than just metrics; they give the personnel a picture of what is important in the organisation or project. They tell all stakeholders what is important to monitor. KPIs give management information to base their decisions on, manage risks and reduce uncertainty. When the target of performance measuring system is to increase efficiency, KPIs need to reflect manageable factors. It is to be remembered that if the users cannot affect the outcome, there is no point in measuring such activity. KPIs focus on the future. It is crucial that the stakeholders understand the information KPIs and other metrics offer. Therefore, the management needs to

ensure that the information is correctly understood. Otherwise, there is the risk of making decisions based on wrong interpretation. (Kerzner, 2017, pp. 107–111.)

According to Angle, (2019, p. 39) so called cause metrics, which are collected at the process level, make the best KPIs as they give the reason for effect metrics and provide details. The important issue when speaking about KPIs is “actionable”. This means; as KPIs are in place, is it also considered who will act when necessary and do the people that see the need for action have the authority to correct the situation. KPIs tell how close the organisation or project is to achieving its goals, but they do not tell what must be done to achieve them. (Kerzner, 2017, p. 112.)

Parmenter (2020, pp. 53–55) is highly of the opinion that KPI has seven characteristics, as follows:

- **Non-financial** – once there is a mark of money, the metric becomes a result indicator.
- **Timely** – for KPIs it is not enough to measure monthly, quarterly or annually but it should be monitored all the time.
- **CEO focus** – KPIs have CEO’s permanent attention.
- **Simple** – KPI should tell which actions are needed to improve.
- **Team based** – KPI is such a metric that it can be tied to a team, there is always somebody who can fix the issue.
- **Significant impact** – when the focus is on the KPI, success will come from many directions.
- **Limited dark side** – before becoming a KPI, a metric needs to be checked to be sure that it will help teams to benefit the organisation.

Bigger companies should have their measurement system built so that there are 10 key result indicators (reported in board meetings), 80 result and performance indicators (reported daily/monthly) and 10 key performance indicators (reported 24/7). By defining the critical success factors, KPIs are easier to find

as the connection between them is essential. (Parmenter, 2020, pp. 56–57, 133).

6.2 Plan-Do-Check-Act cycle for quality improvements

As quality management combines several management and improvement approaches, it has many techniques to do it. The best-known may be the plan-do-check-act (PDCA) cycle, which forms a cycle of continuous improvement. It is known to be an efficient improvement technique. (Luoma, 2025, p. 261.) According to Herranen (2020, p. 18) the cycle is meant to be the key principle of continuous improvement. The cycle can also be called Sewhart cycle or Deming cycle. Also, the original version of the name, PDSA cycle, can be seen. There the letters stand for plan-do-study-act. (Laman, 2022, p. 266.)

In the figure 8 “plan” is linked to developing technology and concepts, “do” is linked to developing processes and products and testing in a pilot area, “study” is linked to confirmation of product and process competence, and “act” stands for continuous improvement.

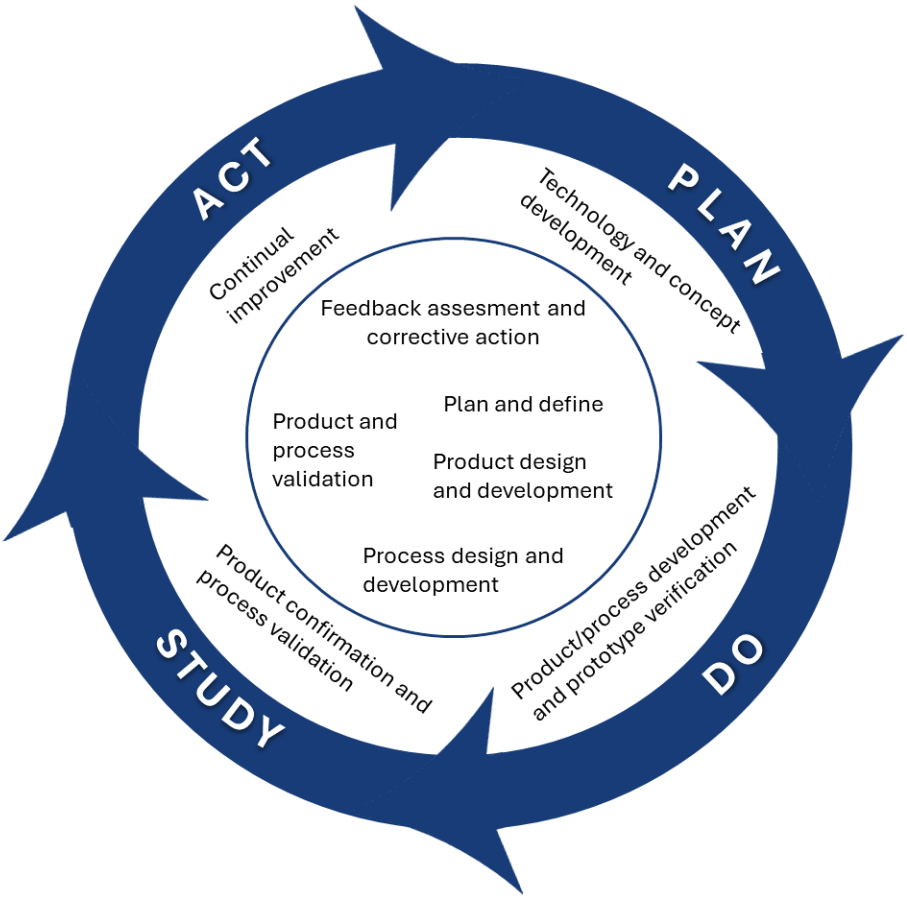

Figure 8. Plan-Do-Study-Act cycle (adapted from Laman, 2022, p. 266)

The idea of the tool is first to plan carefully what to do and collect and analyse data, then fulfil the plan. Next, the results of the plan should be studied to see if it worked as expected or if there were any discrepancies. The final step is to act according to what worked and what did not. After that one should make an improved plan based on the results and start the cycle again. (Laman, 2022, p. 266.) If the end result was successful, the new level of quality should be made the new standard (Slack & Brandon-Jones, 2021, p. 518). Learning from the improvement is important to avoid the same type of disorders in the coming time (Bergman et al., 2022, pp. 201–203).

6.3 Process improvements

Efficient improvement is the definite goal of process management. Improvement comes from closing the gap that exists between present and wanted

performance. (Slack & Brandon-Jones, 2021, p. 418.) There are some crucial issues which should be considered when wanting to succeed in improving processes. The process owner and the development team need to know the methods with which the targets can be reached. Everyone involved in the process also needs to know the quality requirements, delivery times, internal clients, and their expectations. In addition, everybody has defined their needed knowledge in the process and the means to keep it up to date. (Tuominen & Moisio, 2021, p. 63.)

Shaping in process level tends to recognise how the current processes can be modified to be a bit more efficient or how they can provide new products or services. The goal in shaping is to produce small changes that have big effects. Usually, the processes produce pretty good results, but the management naturally wants them to be still more productive. Shaping is a good tool for such situations as it isn't reasonable to throw all the work away and make everything new. Perhaps in the process of doing so the good things that were already working well will be lost also. In such a case the result may be worse than the starting point. (Ritakallio & Vuori, 2018, p. 104.)

A stable process is the base for process improvement of any kind. It is not worth to measure speed or quality before the process is predictable and steady. To achieve sustainable process improvements, there is a sequence existing which to follow. The foundation in the sustainable process improvement is that the process delivers what the customer wants, i.e. quality. When this is in order, the process should be done as dependable. Once the process meets customer expectations in terms of quality and delivers the quality regularly, it can be thought of to make the process faster. In this phase methods of improvement, that cut out such activities which don't add value to customers, are used. Cost-efficiency is the target what most want to reach through process improvement. It needs to be remembered that it is the outcome of the improvement and not the means to improve processes. (Holweg et al., 2018, pp. 172–173.) The process improvement model is illustrated in figure 9.

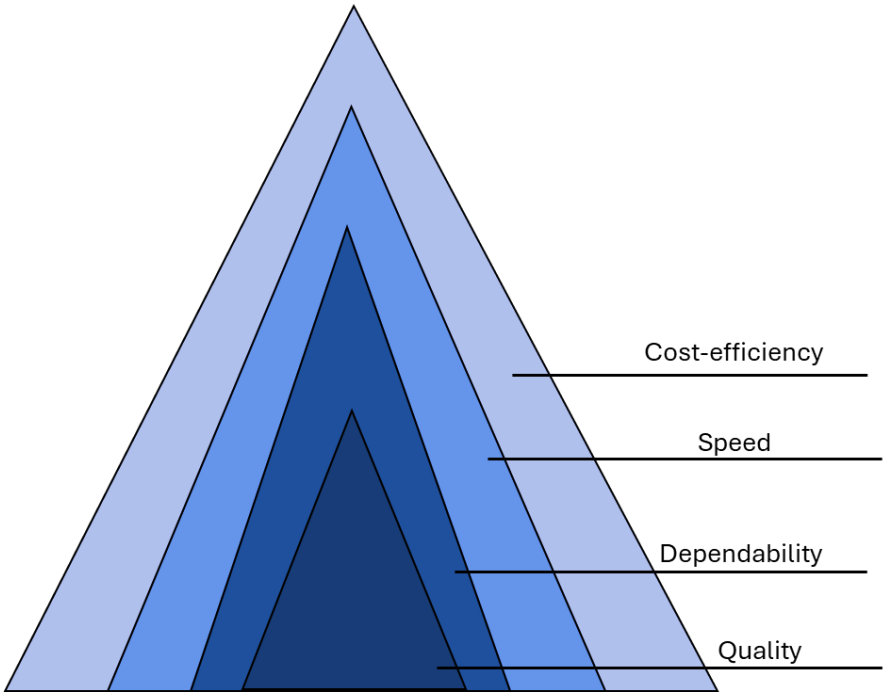

Figure 9. Model of process improvement (adapted from Holweg et al., 2018, p. 172)

Measuring process should take place as soon as the task is performed, otherwise there is a chance of making new mistakes. Phases in the process that affect most quality and efficiency are good places to start measuring. Other essential points are the locations which need lots of resources and costs. To evaluate what to measure, clients should be asked what is important for them, personnel what is practical for them and the suppliers, what kind of measuring would fit them. The best person to measure is the person who did the work due to knowing the work best. This also creates a good place to get feedback and an opportunity to correct the process if needed. (Tuominen, 2021, pp. 93–94.)

6.4 Continuous improvement in development work

In the development work the in literature mentioned attributes for good measuring system will be considered when studying what kind of metrics are already existing in P&O and when defining KPIs for the organisation. In the interviews will be asked opinions about how the already existing metrics are working and what kind of development ideas the interviewees would have for the

measurement system. This information will be mirrored to the theory of continuous improvement.

As the objective of the work is to develop processes and their interfaces to work as efficiently as possible, continuous improvement is needed for the part “as efficiently as possible” because “efficient” cannot be defined without measuring. When the research results are ready, based on them will be estimated the possibility of using process shaping, mentioned by Ritakallio & Vuori (2018, p. 104), to improve process performance.

To provide further development proposals being one of the goals for the work, the theory of continuous improvement will help the researcher to form the proposals for the future. PDCA cycle can be utilised almost in any part of the research and when giving development proposals. It is a good tool also for the organisation to use in the future to maintain continuous improvement.

7 IMPLEMENTATION OF THE RESEARCH

For the development work the research was done through interviews and document analysis. The intention was to collect as much information as possible about the studied interface with the help of the themes in theoretical framework, chapters 4-6. According to Ojasalo et al. (2015, p. 40) it is recommended to use several research methods as it makes development work related decisions more reliable.

As the researcher does not work in P&O, introduction of her and about the development work was sent within the organisation before the research started. The introduction was done to build employees' trust for the researcher and to facilitate participating in the interviews. Herron (2019, p. 149) mentions problems that interviewers may face, one of them being related to identities with strangers.

7.1 Implementation of interviews

Before the research interviews, a test interview was done with one employee from department that is not part of the studied interface. Test interview was done to check the functionality of the interview questions. Based on the test interview and interviewee's feedback the questions were modified. Mainly the questions provided such answers which could be seen as bringing response to the research question.

The interviews were carried out as semi-structured personal interviews in September-November 2025. The interviewees were chosen based on the department and role in the company. The invitations were sent to different roles within one department to achieve as wide picture of the studied phenomenon inside of one process as possible. As Vilkka (2025, section Saatekirje arvioinnin kohteena) mentions, three issues in cover letter affect people most when deciding whether to take part in research or not. These are visual appearance, content and its' reliability and trust in ensuring the protection of personal data.

In the invitation was described the goal of the research, the approximate duration of the interview, confidentiality and anonymity. It was told that the interview will be recorded, and the recording will be destroyed once the development work is ready. These issues were explained to gain interviewees' trust. The invitation was also visualised to ease the readability and to raise the interest in taking part to the research. The invitation is seen in Appendix 1.

23 invitations were sent, and 11 persons were interviewed. The invitations were first sent to people working on supply process to start with the status of that process and challenges they face. After some interviews, the invitations were widened to persons working on project management process.

To make the interviewees feel as comfortable as possible in the occasion, the interviewees chose themselves whether face-to-face meeting or Teams meeting fits best for them. For the same reason the interviews were arranged in Finnish when the interviewee was Finnish-speaking. When using the language that is native for both parties, it was intended to reduce unnecessary tensions on both, interviewee and interviewer. In addition, it was thought that it would be easier for the interviewees to speak about possibly unfamiliar issues rather in their native language. With the language chosen, the purpose was to minimise the misunderstandings and therefore help the research to be successful.

In the beginning of the interview the goal of the research, the confidentiality and anonymity of the interview were once more explained. In addition, it was clarified that it is acceptable not to answer questions in case the interviewee doesn't want to. Furthermore, it was told that during the interview the interviewer will tell small excerpts from the theory of quality, processes and continuous improvement to ensure that the interviewees understand what is meant with specific terms in the questions. The planned course of the interview is seen in Appendix 2.

Teams meetings were recorded and transcribed by the program. In the transcriptions the name of the interviewee was deleted, and the text was summarised almost word for word by deleting vocables. Face-to-face meetings were

recorded by voice recorder. The transcriptions were written in Word document and were made anonymous from the beginning. They were also written almost word for word, ignoring the vocables. The transcriptions were sent to the interviewees for check-up, and they had the possibility to change the text if they wanted. In couple of occasions the interviewer asked additional clarifications. Ruusuvuori & Nikander (2017, section Haastatteluaineiston litterointi) mention that the analysis of the interview material starts from transcription as the transcriptions form the research data. The level of precision is defined by the research question and method of analysis. For the research question in this development work the content in the interviews mattered rather than the way of expression. That is why the vocables were left out from transcriptions.

The Word documents containing the transcriptions were named as “Interview 1”, “Interview 2” etc. and saved in cloud service where nobody else but the researcher has the access. The transcriptions were read through several times. To find the essential in the material, content analysis was used. Based on the interview data, three categories were identified into which the interviewees' responses could be classified in terms of efficiency of process interfaces. Applicable issues in the transcriptions were copied to separate three documents: issues related to system, processes and standard, issues related to persons themselves, and issues related to organisation. The answers to these categories are seen in chapters 8.1-8.3. Some emerged issues may be present in several categories.

7.2 Implementation of document analysis

For the document analysis process flow charts and descriptions were chosen from the studied process interface, i.e. supply and project management. In P&O for supply is existing separate flow charts and descriptions for logistics and purchasing. Both were included in the document analysis. In figure 10 is seen the studied interface in process flow chart.

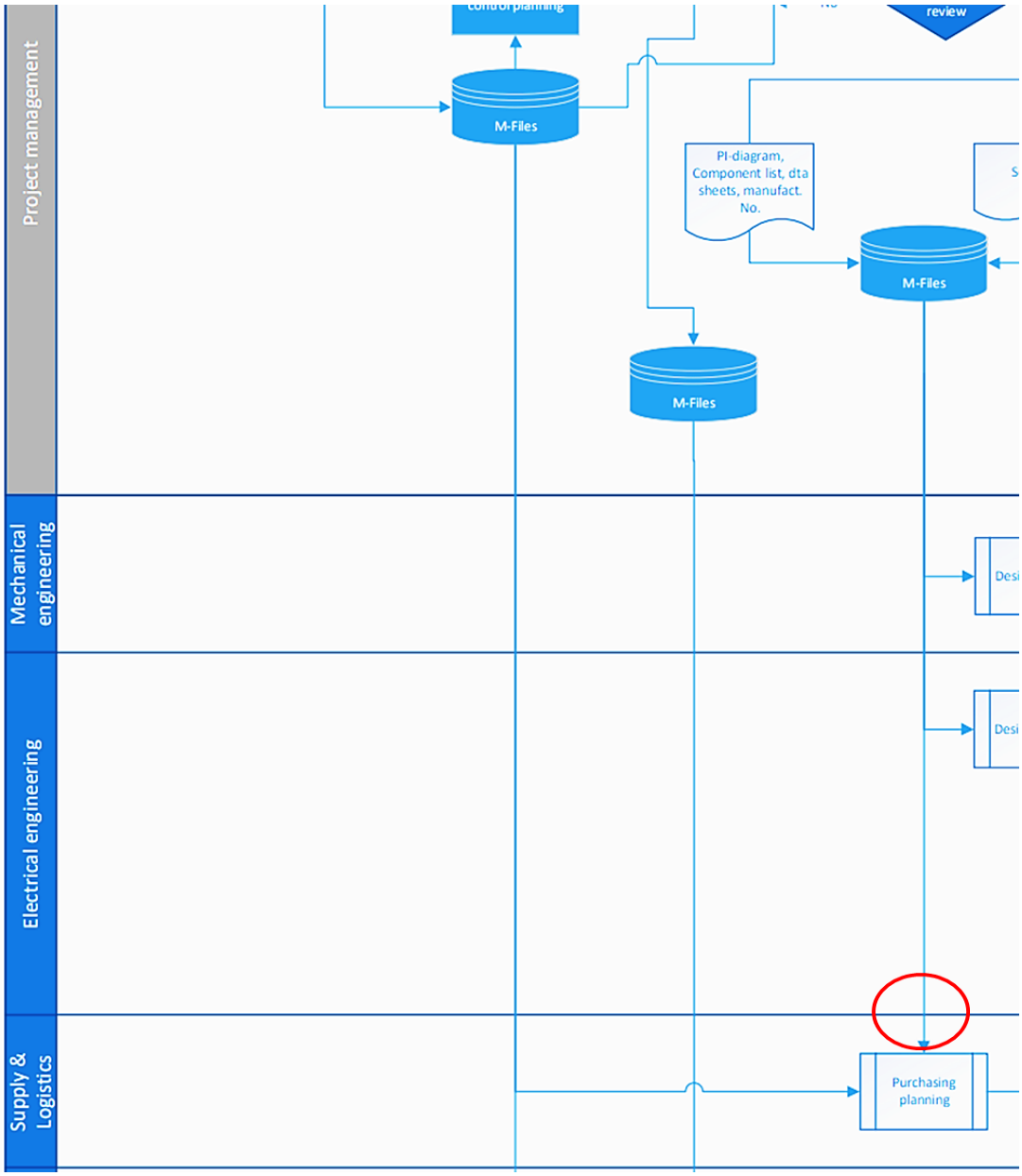

Figure 10. The interface of project management and supply

The document analysis in this work was used to support the understanding of the structure of organisation and processes. The documents were studied to check the content of them; if roles and responsibilities were mentioned, inputs and outputs were described and if exceptional procedures were considered. The clarity, consistency and explanation of used terms were evaluated. Timeliness was an important feature to consider. An Excel table with features to be checked in the process documentation was created, like seen in table 1. In the process documentation should be mentioned the responsible, initial data,

resources, process clients, outputs, main phases, metrics for success and the way to handle feedback (Tuominen & Moisio, 2022, p. 80).

Table 1. Features for document analysis

Type
Date
Expired?
Clarity of document (1–5) (easy to read, logical)
Inputs and outputs mentioned
Responsibilities and roles expressed
Are exceptions considered; if process doesn't proceed as planned?
Are used terms opened to reader
Operation of performance measurements explained
Needed technical tools mentioned
Process interfaces considered
End client considered

Process descriptions were read several times, and the table was filled accordingly. Process flow charts were studied by mirroring the appearing issues to the table and filled accordingly.

8 RESEARCH FINDINGS AND DEFINITION FOR KPI'S

The outcomes of document analysis regarding process documentation revealed that most of the documents were outdated. This was confirmed in the interviews; when the process charts were mentioned, all interviewees brought up the issue that it was lately discussed to update the charts. The interviews revealed lack of systematisation and unity, which add possibilities for faults and decrease the efficiency of processes and their interfaces. In the interviews risen issues affecting interfaces, grouped in three: related to systems, processes and standard, related to persons themselves, and related to organisation, are presented in this chapter.

Process interfaces stand for connection points where multiple processes interact by combining responsibilities, data exchange and timing (Parraguez et al., 2016, p. 4). Once factors for successful interface efficiency are recognised, metrics can be built to solve the challenges in the interfaces and advance the cohesion of processes. All organisations have their own definition of success because there are different clients and different stakeholders existing. As an example of success factor is given resources, which are good communicators, work well in difficult environments and succeed in teamwork. (Kerzner, 2017, p. 99.)

8.1 Findings on issues affecting interfaces due to systems, processes and standard

The studied process descriptions were clearly written, for process flow charts it was partly difficult to keep track with the course of function. Inputs, outputs, responsibilities and roles were mentioned in all process descriptions. Mainly also exceptional situations and end clients were considered, and the terms were opened to the reader. For process interfaces in the documentation the situation was that they were mentioned or existing as swim lane borders. However, the interfaces were not really considered or specified in relation to what is needed from surrounding processes for the interfaces to work fluently. When

mapping processes, it is a good idea that the process owner makes preliminary bordering for them. After that the interfaces should be defined so that sharing of responsibilities becomes easier. (Tuominen, 2021, p. 50.)

The most important issue that stood out in the interviews regarding systems, processes and standard was that the information and documentation that is coming to the process as an input would need to contain all the needed information correctly, clearly and timely. Information is nowadays considered as production factor because data has notable impact on production processes (Holweg et al., 2018, p. 33). To keep the information flow positive is seen beneficial for the actual needed information to go through. The input should also not contain information which is not necessary for the issue in question. The needed features would need to be defined in cooperation with all departments for all processes. The quality of input affects crucially on process efficiency and the quality of output (Tuominen, 2021, p. 58).

> To separate the information which is mandatory, and which is nice to have. But if it's not defined what is mandatory and what is nice to have, I will never fulfil.

The same requirements as for information, apply to the metadata in documentation system. The quality and organisation of data and functionality of tools was mentioned to be a challenge. Because the idea of relevance is subjective and depends on the person, it is important to make clear instructions what information is relevant for metadata in documentation system (Pomerantz, 2015, section What's it all for?). It is important to know where to look for information, that's not always clear for everybody. For some systems, like Paavo and M-files, there exists the wish that they could be simplified to save time and have fewer possibilities for mistakes.

When the timetable for the project is updated, the information about the update is not always reaching everybody as it should. The end of the timeline would also need to be considered if the timetable is prolonged from the beginning. For all the information to move fluently in the organisation it would need to be decided what is the channel for certain information and everybody would need

to use the same channel always. Like Tuominen & Moisio (2022, p. 74) point out, the organisation needs to define what kind of internal communication it needs to ensure functionality and efficiency of operation. This definition includes also the channel for communication.

Another major topic risen in the interviews was lack of templates and checklists. The interviewees see that the lack of templates and framework leads too often to unnecessary mistakes which might even go across the whole supply chain and end up at the final customer.

> We need more templates, more framework, more basics and see more generic. Templates, templates, templates. Working templates, easy templates. And easy to find them as well.

Documentation needs to be user-friendly, easy to maintain and easily on hand. In addition, it must be comprehensive. In the operating system documentation all the needed instructions or references to them are to be found. The organisation is to take care of availability of documented information, its' protection, distribution and archiving. (Tuominen & Moisio, 2022, pp. 75–76.) Generic checklists for project documentation are also seen as helping to follow the demands of standard ISO 9001. Especially as the feeling is that there is no routinisation to standard demands yet existing. Also, an opinion of the organisation not making use of the standard as widely as it could, was presented.

When producing documents, it is seen helpful that the style of certain documents would always be the same. Then it is possible for the recipient to already know in which part of the document to find which information. This makes working smoother. All the documents should be designed with keeping in mind the actual users of the documents, and the documents are to be simplified to be understandable and easy to use (Tuominen, 2021, p. 84). It was also mentioned that in the face of the customer, it would make the company look more professional when the appearance is consistent. As Närvä & Ojaniemi (2023) also mention, standardisation helps the work to be performed always in the same way regardless of who did it. Once standardisation is complete, it helps to find the best practice for the tasks and to develop them as well. It is important

that the employees participate in the standardisation process as they are the experts for the work. Because they have participated, they also feel more engaged to standardisation. Holweg et al. (2018, p. 104) mention standard work being documenting precisely what is done in order to determine what adds value and what maybe not. In addition, it forms a base for changes in the future.

Regarding the process flow charts it is wished that they are made to be self-explanatory and as clear as possible. This will have big impact on if the employees find the flow charts useful and will utilise them. It is brought up that flow charts of 15-40 symbols are the most effective and they manage to visualise the situation (Holweg et al., 2018, p. 63). Also, the flow charts alone are not enough but verbal explanation about the processes is also expected. In total it would be seen beneficial if a structure is created for the whole process documentation system. In the system all related documents are to be found in the same place and the way to describe the processes is unified within departments. This means at least process flow charts, process descriptions, work instructions and all other related instructions. According to Tuominen and Moisio (2021, p. 71), quality management documentation should clearly present the entire quality management system and also include the necessary instructions for principles and work methods or at least references to them. It was also said that sometimes it is unclear who is the owner of which process. When there would be a need to change something in the process, the employees don’t know who to inform. As Fleischmann et al. (2020, pp. 216, 224) state, it is the process owner who is responsible for process documentation. When starting to map processes, the essential questions are if a process owner is assigned and if the authority is defined for process owner.

For continuous improvement there is seen the challenge that when suggestions are made, there would need to be someone catching the issue and bringing it onwards. For continuous improvement the wish regarding the systems is to have a tool where improvements could be suggested.

When mirroring the findings to the list of possible process behaviour improvements (Fleischmann et al., 2020, pp. 250–251), the following was noticed:

1. **Parallelism and overlapping execution.** No overlaps were mentioned. The wish for faster information flow shows that parallelism could be better utilised regarding documentation and timetable information.
2. **Aggregating activities.** The findings show need for unified framework. With that separate steps could be reduced.
3. **Changing the sequence.** In the findings nothing existed for changing the sequence. The flow of information could nevertheless be checked to reduce useless waiting and improve the usage of capacity.
4. **Elimination of activities.** It was clearly stated that unnecessary information should be decreased.
5. **Elimination or reduction of cycles.** The wish for clear documentation and simple processes indicates that unnecessary check cycles could be reduced. The KPI “Number of feedback rounds” introduced in chapter 8.4 supports this.
6. **Insourcing and outsourcing.** There were no findings for insourcing and outsourcing. Nevertheless, in the organisation the resource control is critical, so this issue is to be considered.
7. **Automating.** In the findings complexity and vulnerability for mistakes in systems were mentioned, which partly indicates the lack of automation.
8. **Reduction of interfaces.** With clear documentation and organisational changes, the interfaces could be reduced or make them more controllable.

8.2 Findings on issues affecting interfaces due to persons themselves

To make the interfaces work more efficiently, it is experienced to be important that the employees are proactive in searching information and have the mindset to understand that for example in different projects different issues are expected from them, even if they’re not mentioned in the job description. For process management to work well, Tuominen (2021, p. 133) states that everyone should define one’s most important information needs and the ways to

keep oneself up to date. Naturally, this is also the responsibility of the project manager to tell all the employees clearly what is expected from them in each project. To have the information needed, persons need to be willing to find it and talk about it, instead of waiting for the information to appear. This is also considered to be personal development and on-the-job learning. Being open to new issues and trying to react to them open-minded is seen beneficial for the interfaces to work better. The ability to preserve curiousness is one of the most important skills in life, and when one can keep an open mind for oneself and the surrounding world, it helps not to repeat the old patterns and survive in the changing world (Ikonen et al., 2023, p. 163). This is partly also thought to be the responsibility of the superior to motivate the employees to have certain mindset, perhaps by own example.

It is seen important that everybody would treat others respectfully and compassionately, keeping in mind that everyone is human. The communication between people should be kept respectful as well. In the organisations operation should be driven by common values and respectful and appreciative treatment (Ikonen et al., 2023, p. 74). If possible, taking the recipient into consideration by customising the message, may help the information to go through and save time when no extra explanations are needed. It is also mentioned by Lehtimaja et al. (2023, p. 144) that clear messages save time due to faster reading, and reduce additional questions, misunderstandings and mistakes. All people can only affect their own attitude; this is good to remember. In the interaction with others, it is important to stay curious and try to understand the motivation factors in the background of the interaction partner (Rinne, 2021, p. 174). In the communication in P&O cultural bridge, different time zones and age gap should also be considered.

> There sometimes what is hard is that you understand the way of thinking and working of others.

According to opinions, some issues that are causing inefficiency in the process interfaces might have to do with competence or not knowing how to do things better. This is partly falling in the category of “issues related to organisation”.

It is nevertheless also mentioned that employees need to take care of education and trainings themselves. Some interviewees see it is falling too much on the shoulders of employees, and it would be more the responsibility of the organisation or superior to suggest trainings for the employees. Tuominen & Moisio (2022, p. 73) are of the opinion that when needed, it is the organisation that educates the personnel and estimates the need for training or other action needed for increasing professional skills.

8 out of 11 interviewees stated that best element, or at least amongst best elements, in their work is functional communication.

> I am really happy that we can talk, and we always try to sit around the same table. That's the way to make things happen. That is probably a major good thing in my process.

The communication is seen productive for the work. Whenever needed, the persons in P&O feel the colleagues will always help. The colleagues are helpful, they listen, they try to engage and find out things for others. Nevertheless, a perspective was expressed that even when the organisation communicates a lot, is the amount of communication yet enough. Some interviewees think there exists a mentality that everyone needs to manage on their own, and this should not be the feeling.

Some of the interviewees believed it would be good to have continuous improvement visible all the time. It could help employees to remember it more in daily work. The objective of continuous improvement is for improvements to become part of organisation culture, so being visible all the time is a good goal (Slack & Brandon-Jones, 2021, p. 417). It was also suggested to have a short conversation about the status of continuous improvement for example couple of times a year. Continuous improvement, like running a marathon, prioritises durability over rapid benefits; biannual reviews support this long journey (Slack & Brandon-Jones, 2021, p. 435).

It was seen important for the employees to be open for development. Some interviewees thought they already carry out continuous improvement as they

always try to see possibilities to make things differently. Whereas some interviewees acknowledged that they should think more of how to become better in their work. Wish for the continuous improvement mentality within employees was articulated. On the other hand, some interviewees were happy that the employees are always open to improve and challenge themselves.

8.3 Findings on issues affecting interfaces due to organisation

The mostly arisen issue concerning organisation related topics in the interviews was onboarding of new employees. P&O has grown a lot in recent decades, and some people think that the onboarding process was not always successful. Proper instructions for performing the job are needed. According to Tuominen (2021, p. 85) it is on the shoulders of organisations to ensure that right persons are located on right positions, and everybody has adequate professional skills. The persons should be placed in jobs where they have possibility to cope, and which interest them. In addition, giving the training needed and possibility for learning are important. In addition, Pirinen (2023, p. 24) mentions that orientation is not only the responsibility of superior but in the organisation needs to exist carefully planned orientation program and work instructions.

> If you do something for the first time in a new company, you need to have some guidance. Only asking colleagues is not enough.

Also, when hiring additional resources for hectic times, it is seen important that the extra hands are guided to do the most essential issues. Process owners need to be aware of the know-how and skills needed in their processes, and the information should be utilised for new employees and temporary workforce as well (Tuominen & Moisio, 2022, p. 73). It was also highlighted that according to qualitative thinking when any mistake happens, the organisation should think if the person is familiarised correctly, if the issue itself is described properly and how the possibility for mistakes is minimised. It is important to complicate the possibility to make mistakes. By developing instructions, procedures and tools it is possible to prevent mistakes. (Tuominen, 2021, p. 83.)

Other major concern was the merge with Singapore office. The offices have had completely different ways of working in many aspects and majority of the interviewees see that the integration of working methods and rules has not been successful. This is causing the interfaces to be less efficient. Procedures and processes are important in multi-location work as through them the team functions profitably (Vilkman, 2023, p. 37). It needs to be noted that when a process is in isolation and its productivity is improved, it happens easily that subsystem is created at the expense of the whole system working together (Holweg et al., 2018, p. 38). Thus, both offices in P&O should have common working processes.

Training of the personnel was also highlighted in the interviews. Some people feel that it would be better that the trainings would be more targeted to whole personnel instead of only certain processes or persons. According to Mikkonen (2022, section “Big four-konsulttifirman") training is a traditional way to create operating models. What, how and why need to be explained to the employees. To answer the question “why” is essential as if the employee doesn’t understand the reasons for change, probably the change will be seen as unimportant.

> I wish we had many open trainings and not limited to certain persons as in the organisation there can be a lot of interest to find out about the next step in the job and what is done there. The trainings are so limited, should be more open, so that anybody who is interested can join. Because it can be exactly the next phase and you would like to know what they need to make your own work better.

With education and training the organisations build up human capital, which is their workforce (Holweg et al., 2018, p. 32). One aspect for the trainings in P&O is that there might be new products available in the organisation and not everybody is familiar with them. The knowledge about the products one is working with is seen very important. Therefore, the organisation should guarantee that specific trainings about upcoming products are organised, and the personnel has time to participate in them. The whole supply chain would need to understand with what they are working on. Tuominen (2021, p. 85) mentions

that organisation needs to give the training which is needed in both, the current and future assignments.

Multiple times in the interviews it was mentioned that the quality checks in the warehouse for both deliveries, incoming and outgoing, are missing and it is seen as crucial topic. In addition, according to opinions proactive delivery time monitoring would need to be done more.

When the projects are sold, understanding and commitment of each department is seen extremely important to be taken into account. Because processes cross departments within the organisation, each process step needs to contribute to input-modification-output to gain customer satisfaction (Holweg et al., 2018, p. 38). This means it would need to be agreed between sales and project team which things are possible to deliver and which not. When other processes are also engaged to the sales phase, the processes have different kind of mentality to follow the project. By this is meant that as they have contributed to the project from the beginning, it makes more sense for them to follow and see how the project succeeds. If they were not asked to give their views in sales phase, they could always later say that from the beginning they believed for example the budgeted number of working hours not being enough.

It is wished that when needed, the management would make decisions on issues pretty fast. It is causing frustration that often things take too much time to happen. Committed management making decisions is expressed as a wish in the interviews. The view is that for some topics the total accountability is missing, and nobody can answer employee's questions. Otherwise, the interviewees are happy that the manager's door is always open, and it is possible to discuss issues. Also, the fact that expectations and targets are discussed regularly in P&O was seen beneficial.

The interviewees see that there should be enough resources existing so that there's suitable amount of work for everybody and employees don't get overloaded. Tuominen & Moisio (2022, p. 73) highlight that in the organisation there needs to be correct people in correct places, with correct knowledge. It is also

known and mainly understood in P&O that the need of resources varies a lot in the branch of business and therefore it is difficult for the management to foresee.

> We are not prepared for the unpredictable, for the unseen because we don’t have proper engagement, proper system, right people in place.

It is seen that the organisation definitely supports continuous improvement and is open to it, even that it is not completely clear for everybody how continuous improvement happens. Some kind of coordination for the improvements is wished. According to Tuominen & Moisio (2022, p. 62) it is important that all in the organisation tell their opinions about development needs and suggest needed action to make the change.

> It's usually better to come already with a solution rather than explain how we could improve it.

The lack of time seems to be the biggest challenge to fulfil continuous improvement. As the business has changed to some extent with the merge of Singapore office, some interviewees see that at the moment the principle of continuous improvement should be harnessed to raise awareness of that.

> They have to understand that we have to update it based on the business that we are now.

For fulfilling continuous development some interviewees see resistance to change being a challenge. On the other hand, some interviewees think that the challenge is rather number of resources.

8.4 Defining KPI’s for efficiency of process interfaces

Defining KPI’s for process interfaces proved to be one of the most challenging aspects of this development work. Unlike single processes, interfaces are points of interaction between two or more processes, where responsibilities, information flow and timing come together (Holweg et al., 2018, p. 196). Measuring performance at these intersections requires indicators that reflect

cooperation and quality of information transfer. If the metrics are too complex, they might create unnecessary bureaucracy without adding real value. In the best case the information needed for the metric is already existing in any system where it can only be collected, instead of making a completely new system for getting the results for KPI's (Herremans, 2020, p. 78). Based on the research results, in table 2 are presented proposals as KPI's for process interfaces in P&O.

Table 2. KPI's for process interfaces

KPI	Description	Methods	Frequency
Accuracy in documentation	Number of detected errors in documents crossing interfaces	Checklists Audits	Monthly
Number of feedback rounds	Number of clarifications needed before work continues in next process	Registering number of flawless transactions	Monthly
Meeting efficiency	Planned vs. actualised meetings + action originated from meetings	Calendar Minute of meeting	Monthly
Count of continuous improvement ideas	How many suggestions made for continuous improvement by personnel	Collecting information from system	Quarterly
Count of executed improvement ideas	How many improvement suggestions led to actual change	Following actualised improvements	Quarterly
Trainings, participation rate	How many participates to trainings regarding interfaces	Reports from HR	Biannually

Like is mentioned by Carvalho (2022, p. 119), it is possible that KPI's are defined by each production unit but to work appropriately they must mirror organisation's strategy because KPIs channel the decisions on daily basis in operational units. The presented KPI's focus on operation of process interfaces, and they mirror P&O's strategy, especially part "operational excellence".

"Accuracy in documentation" matters because errors in documentation often lead to rework, which is costly. They can even lead to compliance risks. In KPI "Number of feedback rounds" a low number presents caution, clear requirements and good communication. Frequent feedback rounds may indicate bottlenecks. "Meeting efficiency" has to do with not having meetings just to have them but to generate outcomes from them. As in P&O there was the wish to have short project meetings to know the status, this KPI could be linked to project milestones to see if number of meetings correlate with project progress. With "Count of continuous improvement ideas" the organisation can see how engaged and innovative its' personnel are, whereas "Count of executed improvement ideas" shows the personnel if the organisation moves to action with the ideas. With "Trainings, participation rate" P&O can see how willing the employees are to tackle the challenges in interfaces and change them into possibilities.

In figure 11 is presented the path of forming the KPI's. On the left stands the efficiency of process interfaces, which is the starting point. According to Parmenter (2020, p. 133), when critical success factors are recognised, KPIs are easier to find. The success factors for efficiency of process interfaces are presented in the middle of the figure, being standardising, status meetings for projects, knowledge of supply chain and continuous improvement. The success factors are recognised from the research material. Between process interfaces efficiency and success factors the arrows go both ways because the more the success factors are improved, the more efficient the interfaces become. Based on the success factors the KPI's are presented on the right in the figure. They are drawn as solutions to the biggest challenges in the interfaces related to success factors.

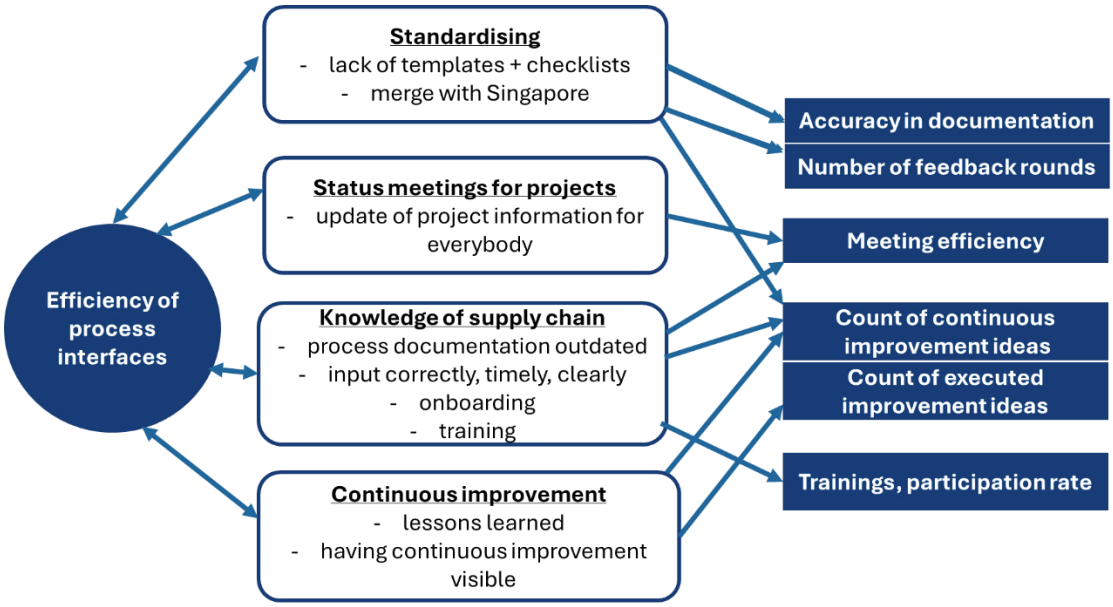

Figure 11. The path of forming KPI's

Because of lack of templates, checklists and guidelines and merge with Singapore office, P&O needs standardising. Both KPI's, "Accuracy in documentation" and "Number of feedback rounds", are built to help with the standardising work, aiming for flawless template documents. While the standardising is in process, some of the new working methods may be counted to be an idea for continuous improvement. For everybody in the organisation to have all the needed information about ongoing projects, status meetings are needed in P&O. With the KPI "Meeting efficiency" the success factor can be followed and improved if needed. The knowledge of the whole supply chain needs to be spread in P&O to solve the experienced challenges like outdated process documentation, correct, timely and clear input from process to another, unsuccessful onboarding for new employees plus inadequate training about other processes and new products. To monitor this success factor, KPI "Trainings, participation rate" was presented. KPI "Meeting efficiency" can positively impact success factor knowledge of supply chain, as improved meeting efficiency may help employees gain a clearer understanding of the quality requirements for their output, which becomes an input to the following process. "Count of continuous improvement ideas" is linked to supply chain knowledge because, as challenges in supply chain knowledge are solved, new ideas for continuous improvement naturally emerge. Since in P&O there is a need for lessons

learned process and the wish of continuous improvement to be visible was presented, continuous improvement is one success factor in the efficiency of process interfaces. It can be monitored through KPI's "Count of continuous improvement ideas" and "Count of executed improvement ideas".

When implementing KPI's, practicality must be considered. Data collection should not consume lots of resources compared to the benefits gained with the metric. When the KPI's are linked to organisation's strategy and merged into process documentation, they will help efficiency improvements at interfaces to become systematic (Mtau & Rahul, 2024). A KPI is also presented for further development ideas in chapter 10.5.

9 EFFICIENCY OF PROCESS INTERFACES AT ALFA LAVAL POWER AND OFFSHORE AND CRUISE

The purpose for this development work was to specify how internal process interfaces work. Creating metrics for process performance was included in the goal. In the quality documentation the process interfaces are not described in any way and the requirements for them are not defined. For many of the issues that came up in the interviews the organisation is already aware of, and some corrective actions are taking place.

The interviewees were asked to evaluate present functionality of internal interfaces in general with the scale of 1-5. The scale means as follows: 1=doesn't work at all, 2=functionality weak, 3=functionality fair, 4=works well and 5=works very well. As an average grade for the interface functionality was given 3,3. The verbal answers about functionality at present are illustrated in figure 12.

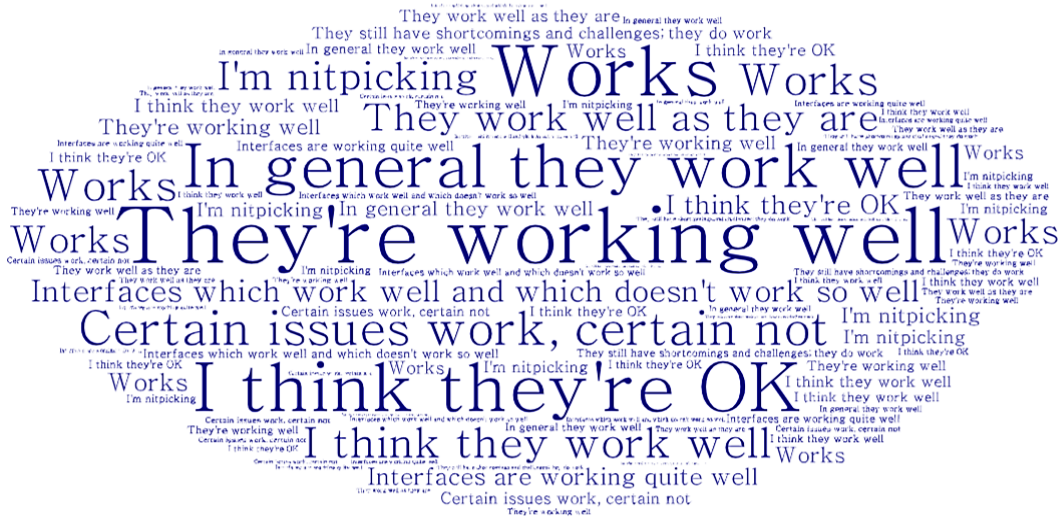

Figure 12. Answers about interface functionality in general

The most important issue for the future regarding efficiency of process interfaces in P&O is to spread the knowledge of the whole supply chain to everybody. The better an employee understands the value of one's own work, the more efficient the development work is (Mikkonen, 2022, section "Arvo — mitä työsi"). Understanding the supply chain brings predictability in the work. As an example, it could be done by bringing up couple of key issues from each phase and they would be introduced to everyone. The main point is that everybody understands the demands of the next process after their own. That enables to make outputs as good as possible. As Slack & Brandon-Jones (2021, p. 196) mention, if it's not understood how process chain interacts, it may weaken the overall success of the operation. Also, the features in the previous process should be understood. The demands for inputs and outputs should be clearly defined for each process. For the whole process chain to reach its' targets and satisfy customer can happen only once the suppliers inside of a process reach the goals and operate as agreed (Tuominen & Moisio, 2022, p. 81).

Proper knowledge of the whole value chain may clear to all parties their responsibilities, liberties and roles as part of bigger entity (Mikkonen, 2022, section "Arvoketju — mitä askelia"). In the process map everybody can see how one process is related to others and to which process one's own process produces services (Tuominen & Moisio, 2022, p. 80). The detailed information should be included in process documentation, for example by creating links from process flow chart to a document where the demands are defined. Such work is already ongoing in P&O.

Even so in today's working life the employees often have a lot of meetings, it would be good that the people working on a project would not be afraid to regularly organise status meetings about how the project is ongoing. The meetings would be a place for each party to raise their concerns and ask questions, and everybody would hear about the challenges and solutions there are existing. In addition, a minute of meeting needs to be done so that there is evidence on the agreed issues. Minute of meeting is needed because meetings encapsulate information. If one has not been part of the meeting, one

might miss important information. (Mikkonen, 2022, section “Visuaalinen johtaminen”.)

Standardising the delivery of projects would help in many of the concerns that emerged in the interviews. Mikkonen (2022, section “Lähteekö muutos”) mentions standardising to be excellent method to gain clarity for information flow. In addition, Ikonen et al. (2023, p. 49) highlight that target in process management is clarity, which can be reached with the help of routines, focusing on responsibility definition, measuring and documentation. Creating templates, framework and instructions for each project phase with wide enough perspective and making process flow descriptions for projects in general will help the efficiency of interfaces because the responsibilities will be clear for all parties. Tuominen & Moisio (2022, p. 75) mention that documentation needs to describe the connections between manufacturing processes.

When the demands of standard ISO 9001 are built-in to the templates and processes, it helps the organisation to follow the requirements automatically, so to speak. Using templates and having through that a unified appearance looks more professional to clients and shows them that standard ISO 9001 is taken into account in the organisation. The lack of templates is already recognised. In addition, new management manuals for all standards P&O have, are currently being produced. The benefits of standardisation are for example consistent quality, learning a task faster, easier move from job to another and easier way to choose a supplier (Tuominen, 2021, p. 84).

The work of updating process documentation is soon to come in P&O. The wishes of personnel regarding the clarity and structure of it should be well considered. The best way to do so is to engage the persons working on the process, and in the interfaces, to the update work. When people have the possibility to influence on changes, they often are happier with the results (Pirinen, 2023, p. 27). What comes to mapping processes, the earlier stage the personnel are engaged to the work, the better the flow charts will be understood and utilised (Saarinen, 2021).

The principle of continuous improvement would be rather easy to fulfil in P&O based on done projects. Once a project is finished, all people having worked with it come together and share the information they have learned during the project. By the results of the lessons learned process a group of people would be nominated to make the needed changes to documents, processes, instructions etc., wherever needed. This would close the gap between current and wanted state of performance (Slack & Brandon-Jones, 2021, p. 416). Lessons learned process will help the efficiency of interfaces in the future projects considerably. In the organisation the process is already planned.

In figure 13 is seen the research questions once more with the most essential answers to them. For the main research question as how the processes, their interfaces and tasks of process owners should be developed to make the interfaces work as efficiently as possible the main answers are knowledge of supply chain to be spread to everyone, standardisation of work, regular status meetings and bringing the process documentation up to date. For the current and wanted status of interfaces the answer is that the interfaces work well at present, as by the average grade given to the functionality. But there is still room for improvement. Wanted status includes better documented and standardised work plus increasing automation, where possible. Spreading knowledge of supply chain will help to gain the wanted status for the interfaces.

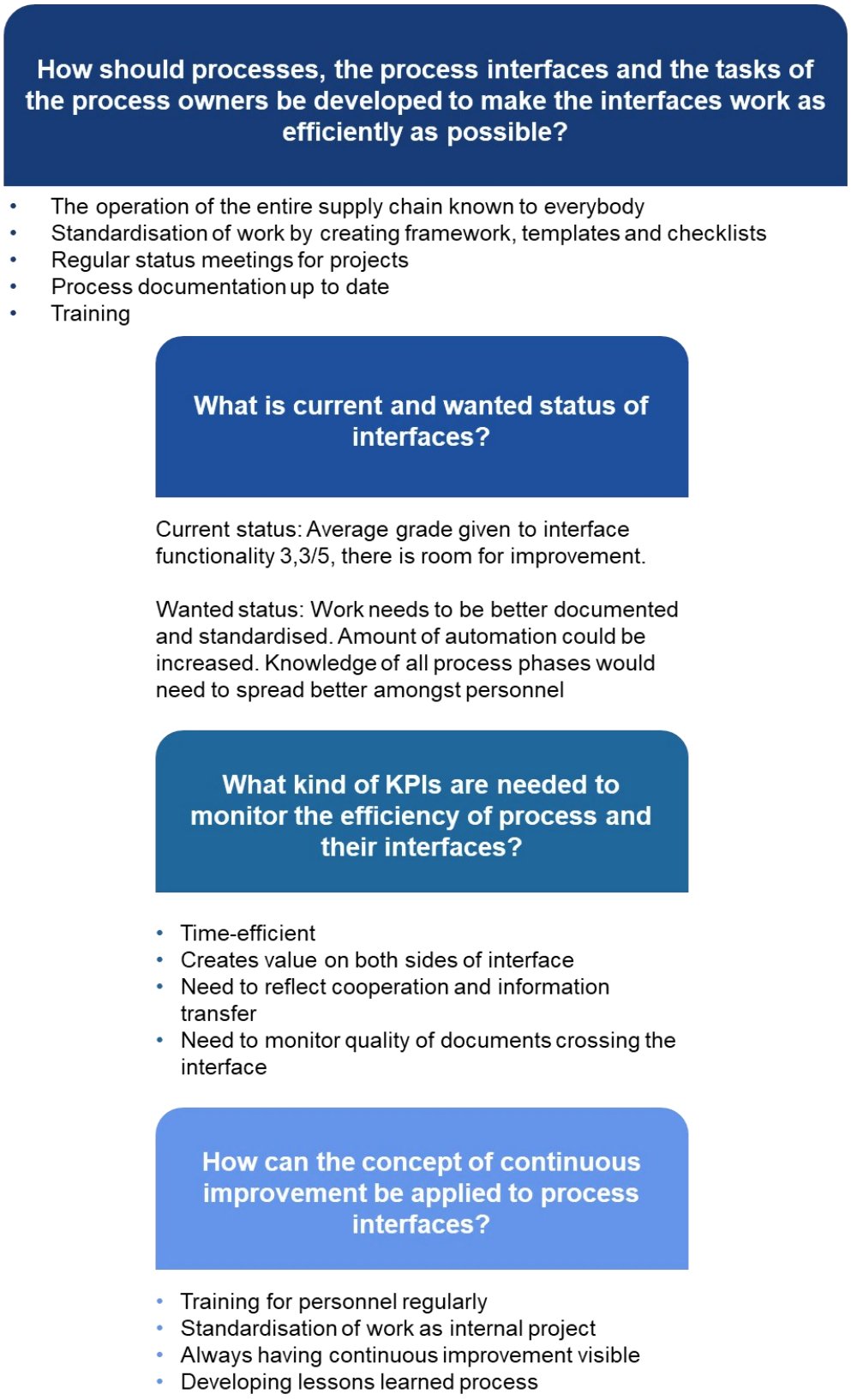

Figure 13. Answers to research questions

For the research question about the appropriate KPIs the answer is that suitable KPIs need to be time-efficient, create value, reflect cooperation and

information transfer. The KPIs should also monitor the quality of documents crossing the interface. For the question how the organisation can apply continuous improvement to the interfaces the answer is training the personnel. The standardisation of work can be executed as an internal continuous improvement project, which constantly has the focus on creating and updating templates. In addition, at all times having continuous improvement visible and developing a process for lessons learned will help to apply the concept of continuous improvement in P&O.

10 REFLECTION ON DEVELOPMENT WORK

This development work is done to be as open about the studied phenomenon as possible. Quality, documentation and processes together are a big entity, and every organisation has different way to maintain them. Researcher's view is that quality should be seen equally important issue in the organisations as safety is considered today. With global and digital world, the possibility for customers to evaluate the products and services critically worldwide increases. This makes quality something that should be in focus of each organisation. Process management and continuous improvement also play crucial role in global business. In that regard, this development work is useful for any organisation which is interested in increasing efficiency inside of the organisation.

The development work succeeded to reach the targets set in the beginning. Due to its complexity, defining KPI's for process interfaces did not fully meet the objective, and the indicators are kind of artificial. This is due the presented KPI's not fully meeting the beneficial characteristics mentioned by Parmenter (2020, pp. 53–55). In the list below as first word is presented the wanted characteristic, after that the status of the presented KPI in relation to the wanted. In the end it is mentioned if the characteristic is met or not with word "positive" when it is met and with "negative" when it's not met.

- **Non-financial** – none of the presented KPI's are financial. *Positive*
- **Timely** – the presented KPI's can be measured all the time rather than monthly or quarterly. *Positive*
- **CEO focus** – the activities for most of the presented KPIs happen on lower level, and it is not practical for the CEO to have them in focus. *Negative*
- **Simple** – the presented KPI's don't technically say which actions are needed to improve. *Negative*
- **Team based** – the presented KPI's are possible to tie to a team. *Positive*

- **Significant impact** – when the focus is on the presented KPI's, surely success will come from different directions in related to the success factors. *Positive*
- **Limited dark side** – the metrics will help to benefit the organisation. *Positive*

According to Herremans (2020, pp. 77–78) good metrics have straight connection to the action, their data is relatively easy to collect, their targets are reachable, they give essential aspects for operation, and they are reported often enough. When comparing to this list, the presented KPI's don't meet the requirement of easy data collection and therefore they might create unnecessary paperwork. It is needed to carefully consider if the KPI's can be used.

The experience of doing research was invigorating for the researcher and an interest for making the next research remains. The timetable of the work was met. The most challenging issues in the development work were defining the scope of the research, making the interview questions as clear as possible and determining the KPI's.

10.1 Evaluation of reliability

Reliability refers to a situation where if the research would be repeated, similar results in similar conditions would be produced (Bell et al., 2024, p. 167). With reliability the essential issue is that with the research is gained reliable enough information about the studied phenomenon, which means that the results represent the phenomenon as truthful as possible. Reliability in qualitative work consists of for example how the interview questions were chosen, how the results were saved, and which analysis method was used for the material. (Hakala, 2024, section "Laadullisen tutkimuksen luotettavuudesta".) The issues of how the interview questions were formed, performing test interview before research interviews, the way the interviewees were chosen and anonymisation are presented in the development work in chapters 3.3.1 and 7.1. All these actions were done to improve the reliability of the research.

The references used for the development work are up to date and that affects the reliability positively. The results can be thought to be reliable as there were enough interviewees, and saturation was reached. In addition, the issues the interviewees have brought up were confirmed with the document analysis when possible. As most of the results are based on interviews, the challenges told are the key to the research reliability. The interview questions cannot be seen as too personal or delicate so that the interviewees would have reason not to tell the truth. Also, the option of not answering to certain questions was offered. The consistency of content analysis was ensured by listening the interviews multiple times, the interviewees having the chance to change the transcription afterwards and by reading the transcriptions several times. In addition, the documents consisting of different analysis categories were read multiple times.

Ensuring the reliability of research is not straightforward, as there are risks existing. The risks may stem from errors or biases from the interviewee or interviewer; similar factors affect both parties. (Saunders et al., 2023, pp. 215–216.) In this development work the possible threads to the reliability are limited experience of the interviewees in the current job, inexperience of the researcher as an interviewer and the risk that any of the terms used in the interview were not understood by the interviewee in the way it was meant.

10.2 Evaluation of ethicalness

Scientific research is ethically acceptable and reliable only when it follows the principles of responsible conduct of research. To the responsible conduct of research belong the following features: integrity, caution and accuracy when conducting research. Both, acquisition and evaluation of research material, need to be ethically sustainable. When the research will be published, it needs to be done openly and responsibly. To the responsible conduct of research also belongs respect towards the knowledge of other researchers by citing appropriately. It is also mentioned that the researcher should follow the standards

of scientific knowledge in planning and conducting the research, recording the data and in reporting the results. All the needed permits must be obtained for the research. (TENK, 2023.)

This development work was conducted together with the principles of integrity, meticulousness, and accuracy in all phases: planning, implementing, and reporting. Case study as a research strategy was applied according to scientific principles. The methods applied for data acquisition, semi-structured interviews and document analysis, followed scientific criteria and were ethically sustainable. Confidentiality and anonymity of participants were ensured by informing interviewees about those before and during the interviews, plus by anonymising all transcriptions. The research results are communicated openly and responsibly. Appendices 1 and 2 are added into the development work to demonstrate openness. The organisation has checked that the work does not include any classified information.

The researcher has acknowledged the work and achievements of other researchers by citing their publications appropriately according to Satakunta University for Applied Sciences (SAMK) reference guide, which applies The American Psychological Association's Style, 7th edition. The contract between P&O, researcher and SAMK was done before the development work started. SAMK's thesis template for the work was used. For data protection the material was stored securely so that only the researcher had access to it.

10.3 Evaluation of choice of approach and research methods

A case study is supposed to produce development suggestions about phenomenon in real time and in real context. The study helps to understand the relationships between employees and their operation. The material for the research is collected in a natural environment. (Ojasalo et al., 2015, pp. 52–55.) Based on this and more extensive introduction of case study in chapter 3.1, the choice of approach for the research was successful. The answers to research questions were gained.

As the studied phenomenon have to do with how people feel about the interaction with each other, the best way to find out the feelings is to ask the people. For that the choice of interview was very successful. As the terms the topic consists of are not necessarily clear for everyone, an inquiry would have had the possibility for misunderstandings without chance for clarification. Another option would have been observation. As the researcher does not work in the organisation, the feeling that observation would have not been successful led to the decision to leave the method unused.

Some interviewees focused on the interface between the organisation and external party rather than on internal interfaces, despite of the clarifications done before the interview and during it. The interviewer was not fully capable of guiding the interviewee back to the issue when the talk went to different direction from intended. Interviewer being an outsider led to the situation during the interviews that she could not react to the answers in the way which could have been beneficial for the research. This was only noticed after the interviews when listening to the recordings. A small challenge faced in the interviews was that quite many of the interviewees have worked for the organisation for few years and they might have done only one project. This has affected for example to their thinking about where the input to their working process is coming from and how the feedback from project is gathered.

Afterwards it is easy to see that it would have been better if the interview questions were built so that in the beginning of the interview there would have been couple of easier questions. This is due to the interviewees clearly getting more relaxed during the interview. In that way it was not the best choice to make the questions by topics of the framework, but they should have been sorted rather by difficulty of the questions.

The advice given to novice interviewers “listen more, talk less and avoid interruptions” the researcher tried to follow (Seidman, 2013, as cited in Herron, 2019, section Literature review). Mostly it succeeded but not fully. According to Saunders et al. (2023, pp. 471–472) such non-verbal behaviour and

comments which reflect the researcher's own opinions should be avoided. During the interviews commenting happened couple of times. This was a good lesson of the fact that interviewing professionally needs a lot of repetition.

Document analysis proved to be a suitable method for the development work. Systematic review of existing process descriptions and flow charts helped to understand the organisational context. Using a structured checklist ensured consistency. The method strengthened reliability of the work through triangulation. When triangulation is used to justify multi-methodology, it refers to verifying and confirming research results by using different types of material in the same research (Åkerblad & Seppänen-Järvelä, 2024, section Keskeisiä monimenetelmällisyyden perusteluja). However, the limitations of document analysis were evident: most documents were outdated, and interfaces were only represented as swim lane borders without detailed responsibilities. These reduced the depth of analysis. The crucial information for processes when describing them include meaning of the process, external and internal customers plus their expectations, inputs and outputs and main steps. As these features define how the process connects to other processes, the features need to be specified. (Tuominen, 2021, p. 145.)

10.4 Usability of the results for the organisation

For some arisen findings, the organisation has simultaneously with the research already taken action to correct them and for some there are suggestions made to improve the issues but no actions yet. The standardisation and framework for the projects and documentation are something that this development work brings to the list of things to be improved.

The standardisation of framework will ease employees' work by making it more fluent. It will also show P&O's customers that standard ISO 9001 is followed and gives the customer documentation that is reliable, unified and professional. As customer's trust in the organisation increases with that, it will strengthen competitiveness of P&O. The improvement in efficiency will

naturally bring cost-effectiveness with. The results of this development work show the organisation where it is useful to allocate resources.

The results can be tied to the current strategy programme in the part “operational excellence” through standardisation. The KPI’s will help P&O to follow the efficiency of the interfaces and support continuous improvement. The continuous improvement on its’ side ensures that the processes are developed to answer the changing needs of customers and markets.

10.5 Further development based on results

The organisation has gained with the development work the knowledge about the status of process interfaces now. Based on this it is also known which are the main issues the employees are struggling with in the interfaces. The information this development work offers, creates the base for further development.

The main issue for P&O in the future is to create the standardisation for the projects and their documentation. As further development is proposed to measure the throughput time of one project at this moment. Once the framework and proper templates are in place and the process of a project is standardised, the measuring should be done again for similar project. The results will show how standardisation has affected the efficiency and fluency of work. It should also not be forgotten to actively monitor the quality of framework and keep it updated.

The creation of structure to the work and templates could be done as an internal continuous improvement project. The amount of planned and created templates per month would create an own KPI for the project. After all the templates are in place, the KPI could be built on checked and updated templates.

As P&O is already updating the process documentation, important is to include the process interfaces in it. The responsibilities and requirements need to be clearly stated, and the tasks of process owners defined. When the employees

are made responsible, it is not to be forgotten that they also need to have the authorisation in the field they are responsible for. After the update work is done, it would be useful to organise trainings for the whole organisation about the supply chain.

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APPENDIX 1: INVITATION FOR INTERVIEW

Hello,

as Mick Griffiths has already informed, I am doing my master's thesis for the studies at Satakunta University of Applied Sciences. The thesis is about the efficiency of process interfaces at Alfa Laval Power and Offshore and Cruises. In the thesis there is included research which I implement through interviews. The goal for the work is to produce information about the functionality of process interfaces and make suggestions for further development plus define performance indicators for processes. The intention is that the development suggestions can be duplicated to other processes in the organisation.

Would it be possible for you to take part in the interview?

🕒The interview will last approximately one hour, and it can be carried out either in Rauma or in teams, whichever is more suitable for you.

🎤 The interview will be recorded and after the research is ready, the recording will be destroyed.

💯 The interview is completely confidential, and anonymity will be guaranteed by not using names. In the finished thesis the issues described about process interfaces will be done without mentioning the roles of the people.

If the interview fits to your schedule, kindly let me know your preferred schedule with *date and time* and preferred *method, face-to-face or by teams*. In case you have any questions about this, I'm happy to answer.
With best regards, Eveliina Mettänen

APPENDIX 2: PLANNED COURSE OF INTERVIEW

Please tell me about your role in the organisation.

QUALITY

Mostly the job for quality is to provide the organisation cost-efficiency and competitiveness. There are different definitions to quality, depending on the point of view and situation.

- What do you think quality means?
- When considering that work can be of good or poor quality, what kind of is good quality job in general in your opinion?
- How does quality matter in your work?
- How do you feel that the quality which the whole organisation targets affects your work?

The basic principles of standard ISO9001are focused on customer, process-oriented management, continuous improvement, decision making based on facts and engaging each employee in quality. Related to these, the standard assumes that processes are standardised, and they are utilised systematically, process defects are controlled and there are systems existing to correct failures. In addition, the systems are monitored all the time to make sure they are relevant for the organisation's purpose. Alfa Laval has this standard.

- Do you feel that the standard demands are met in your organisation? Are they shown in your work; how?
- Has the existence of the standard helped you to get more interested in the quality of your own work/investing more in the quality of your work?
- Does your organisation in your opinion operate so that quality improvements are part of everyday activities? (example if possible)

PROCESSES

In the organisations like Alfa Laval processes form entity/network of operation where the output of one process (raw material, information, product, service) functions as input for the following process.

- In your opinion, what kind is the output quality of the previous process to your working process (output which you need in your process as an input)? One could think here about what starts your work, that is the input.
- What works well in your working process?
    - What do you think is the reason for it?
- What doesn't work well in your working process?

  - What do you think is the reason for it?
  - What do you think would need to happen so that things would work better?
  - What is the biggest challenge in the process?

In the process network, the previous process is a supplier to the next process, which is a client. Sometimes also suppliers may need something from the customer to be able to deliver what it is supposed to deliver, for example time schedule, technical information.

- Who is the client of your working process?
  - What are customer's expectations for the output that is coming from your working process?
- Which process works as supplier to your working process?
  - What are the expectations for the input that is coming to your working process?

Two processes crossing each other are called process interfaces, exactly the point where the output from previous process becomes as input to the next process.

- In your opinion how do the process interfaces work?
  - Is there an issue which particularly makes operation difficult in the interface?
  - What works best on the interface?
  - Please estimate the functionality at this moment with scale 1-5 (1 -doesn't work at all, 2 -functionality weak, 3 -functionality fair, 4 -works well, 5 -works very well)
    - 1 to other processes/departments inside of the organisation
    - 2 to external customers

The process interfaces may interact with each other by for example exchanging messages or through joint database from which the next process gets information about the previous process, or by regular meetings.

- What are the ways for your working process to interact with the previous and next processes?

Process charts are visualisations of processes. Their purpose is to create clear picture of the process journey, from beginning to end with information of resources etc.

- Do you know if a process chart and description of your working process exist?

    - If yes, do you search for information related to your job from that? (why not?)
- Do you think the process charts are necessary?

For the process to stay under control, its' operation needs to be measured regularly. For example, the most common metric is throughput time which tells how long it takes for information and material to go through the process, from beginning to end. Usually, the metrics have to do with time, quality and quantity.

- Do you know how the quality or efficiency of your working process is measured or evaluated?
    - If it is measured, do you know the goals for it?
    - If it's not measured, do you know why?
    - Do you feel that the information the metrics provide is useful, i.e. the metrics work well?
    - If the organisation doesn't measure, do you use some metrics on your own?

CONTINUOUS IMPROVEMENT

Continuous improvement happens when everybody contributes development every day, even with small changes to improve things they can affect. In continuous improvement the important thing is not speed but the fact that development happens regularly.

- Do you know how your organisation fulfils continuous development, if it does?
- Do you feel that the principle of continuous improvement is supported in your work?
    - In what way is it supported (for example by giving time to make development ideas)?
- Is the amount of support proper?
- Is your working process changed regularly by the organisation or yourself?
    - If, have the changes improved the operation of your working process?
    - If you have made the change on your own, what was the last change?
    -

Key performance indicators, KPIs, usually come from strategy and they measure operation of the organisation at a high level. KPIs give personnel an idea of what is important in the organisation or a project. With the help of them the management makes decisions, controls risks and reduces uncertainty.

Common KPIs are for example revenue growth, net profit margin, customer satisfaction score and employee turnover rate.

- Do you know what kind of KPIs your organisation has?
    - If, what kind of they are?
    - Do you feel like with your contribution you can affect the issues that are followed with KPIs?