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Organization Design for the Newly Established Function

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This Thesis addressed a business challenge in the case company where I have been working for 10 years. The case company has the same colors used in the figures and tables of this Thesis. I'm proud to use these colors: orange, blue and grey. Many academic reporting practices addressed in this thesis are driven by strict requirements of Metropolia University of Applied Sciences. Otherwise, the report would have been a much more free-flowing paper. But this is not bad! These strict collaborative research principles, as well as the academic reporting practices ensure high quality of the outcome: staring from the font and layout and all the way up to the logical research steps and structure of the Thesis. This is the formal part of the Thesis. However, there is the also a soft part of the Thesis. It is related to the people involved in this Thesis.

I would like to present my humble acknowledgements to all persons involved into this project from the case company's side. From the school's side, I would like to give my warmest thanks to Dr Thomas Rohweder and Zinaida Grabovskaia, PhL for their outstanding guidance throughout the Thesis process. You two persons have helped me to write the hard part of the Thesis but equally given guidance for the personal growth as an engineer, leader and a human being. Additionally, special acknowledgement goes to my supervisor Michel, for the supplier and very positive attitude towards my studies.

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This Thesis focuses on organization design of the case organization that is needed due to the case company re-organizing its processes. The change from a matrix organization to a line management organization has been implemented but the processes, functions, roles, responsibilities and hierarchical structure still need to be defined for one particular function.

The study is conducted by using Action research approach. The data was collected in three phases. The most important data collection methods were qualitative interviews, co-creation workshops and discussions. As a result of the current state analysis, the study reveals the status of the organization design in the beginning of the study. The outcome of the study is the organization design that will be put into implementation immediately after the end of the study and the next steps to create competitive edge by utilizing the new organization design.

Before the solution is built, the study extensively explores the field of organization design in order to reveal the key building blocks of the organization design, understood from two different aspects: first, organization design does not equal an organization chart which is changed from time to time. The main building block of the organization design is the organizational structure. Hence, the study ignites the discussion if the organizational changes take place in the correct building blocks of the organization design, such as its structure. Second, the study relies on the organizational change for functional departments which excludes interfaces to other departments. The results of the study are significant for the case company because they create the basis for the organization to be able to deliver to the customer.

Keywords	Organization, organization design, organizational change, processes, functions, roles, responsibilities, hierarchical structure, structure

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1 Introduction

In modern times of high speed and frequent change, most of the employees have experience some form of organizational change in their working community. Most frequently, change relates to business environment but can also come as a result of acquisitions, mergers and natural growth. According to Morrison (1995: 66):

> *…many change programmes fail, with Harvard Business School professor John Kotter famously claiming in 1996 that nearly 70 % of large-scale change programmes did not meet their goals.*

Moreover, depending on the employee's role and experience in the company, the *organizational change* tend to make employees concerned about their own *role* and *responsibilities* in the changing *hierarchical structure*. Business practice suggests that effective communication of reasons behind the change, participation in the change process and general transparency can help change employees' mind-set from skeptical concerns to seeing positive opportunities and continuity. This Thesis deals with the situation of *organizational change* on the example on the case company that is currently undergoing change due to a new organization design.

1.1 Business Context

The case company of this Thesis is an international company which is producing solutions for marine and energy markets. The company is operating is 70 different countries and has totally over 18000 employees. The case company has organized itself to three different divisions: Marine Solutions, Energy Solutions and Services. (The case company annual report 2016)

The case organization of this Thesis is the Services division of the case company. Its strategy focuses on the following topics: closer partnerships with old customers, new competitive edge from digitalisation, new customer segments by improving on current competences and acquiring businesses in growing markets. (The case company annual report 2016)

In order to implement its strategy in different customer segments, Services division started an organizational change process in 2016. This organizational change affects several hundred employees out of the total 10 000 employees in its Services division. In order for the change to be successful, the new case organization needs an effective organization design.

1.2 Business Challenge, Objective and Outcome

Today, Services division undergoes the process of re-organizing part of *functions* away from a matrix organization into a line management organization. This means among other steps, the creation of a new unit 'EDG Services' dealing with the service part of Emergency Diesel Generators (EDG) in power plants. The new unit's organization will include the following *functions*: Product & Technical, Operations, Sales, Quality and Supply. All the above mentioned *functions* need to be organized. A special focus for this Thesis is concentrate on the development of the newly established 'Product & Technical Management' function.

In order to start operating and deliver to the customer, 'Product & Technical Management' needs a clear organization design. So far, the Product & Technical Management's (PTM) task is describes as follows (Internal documentation: Services to set up one dedicated EDG unit under Product Line 4-stroke Engine Services.pptx):

> *It defines the EDG product long term targets, obsolescence management plans and price level. Ensures and maintains, over the life-cycle, the technical product competence and correctness of specifications for EDG components and products with related engineering and information services. Conducting executing root cause analyses to ensure the compliance of parts and products.*

So far, the case company has implemented change in the EDG Services. New positions have also been opened and selections of General Managers for different *functions* have been made. In the new organization, major part of the employees have been working in the same industry earlier and major part of the *processes* are existing. However, in order to create new competitive edge from the existing elements, further and more detailed organization design is needed, especially about the *roles* and *responsibilities* in the newly established PTM organization.

Accordingly, the objective of this Thesis is to develop an organization design for the newly established Product & Technical Management function. The other four *functions* are excluded from this Thesis. The scope of Thesis includes four different services offered for customers: parts, contracts, projects and field services.

The outcome of the Thesis is the organization design which includes *roles* and *responsibilities* and *hierarchical structure* on a process and sub-function level.

1.3 Outline of the Thesis

In this Thesis, the case company is re-organizing the case organization to meet customer demands more effectively. The change from a matrix organization into a line management organization has been implemented but the *hierarchical structure*, *roles* and *responsibilities* needs to be defined. The scope of Thesis focus on tasks but does not solve all components of the organization design.

This Thesis is written in seven sections. Section 1 gives overview of the Thesis. Section 2 presents the method used for analyzing organization. Section 3 defines the *status quo*. Section 4 presents the framework for the organization design. Section 5 includes development of the solution together with the key people. Section 6 presents feedback given by the decision maker and finally Section 7 presents conclusions of the Thesis.

2 Method and Material

This section describes the research design, data collection and analysis methods used in this study.

2.1 Research Approach

This Thesis applies *Action research* as its research approach for conducting the study. *Action research* originates from social psychology and from anthropological research where researchers were part of the community. The most famous social psychologists were Kurt Lewin (1890-1947) and Elton Mayo (1880-1949). It can be said that action research is an *enquiry with people* rather than *research on people*. (Eriksson and Kovalainen, 2008). High degree of involvement of people in the organization has a specific meaning in *Action research*. In *Action research*, the role of the researcher is to help employees to identify problems and to take actions based on it. In *Action research*, the researcher seeks balance between own control and involvement because higher involvement leads to empowerment but can also create risk of unleashing uncontrolled change. On the other hand, academic reporting and data analysis sets up some limitations for fully collaborative data analysis with involved people. As a result, organizational changes are often implemented via the so-called *participatory action research*; the founders of problem are working also for the solution and strong involvement makes employers empowered as individuals and a group. The difference between researcher and researched organization is minor.

Elving (2005) highlights that employees resists organizational changes mainly because of uncertainty of job and insecurity for employees but also the messiness of the change (Galbraith et al. 2002). Importantly, there are certain evidence which speaks for the *participative approach* in organization design. The *participative approach* means that people who are affected by the organizational change participate to the process to identify current state and make decisions. *Participative approach* offers brings up much more details about *processes* and job the organization is currently handling. This approach also brings up competences and skills which might be specifically needed when implementing the change (Galbraith et al. 2002: 13). The equitable involvement can be justified in many different ways but there are a few rules which define balance between autocratic and

democratic researcher: First, elimination, move or additional positions in the *hierarchical structure* cannot be decided together with everyone. Second, involving everyone to each of the phases can cause considerable workload thus selection of a representative from each group and level is preferred. Third, the researcher needs to communicate the rules beforehand for the involved people: he can ask input for everything but there are non-negotiable issues which need to be decided by the researcher himself. (Galbraith et al. 2002)

The organizational change discussed in this study fulfils the description of action research, offering involvement and a systematic approach to develop the new organization design.

2.2 Research Design

The following research design shows the main stages of the research process conducted in this study. Figure 1 shows research design which is used in this study.

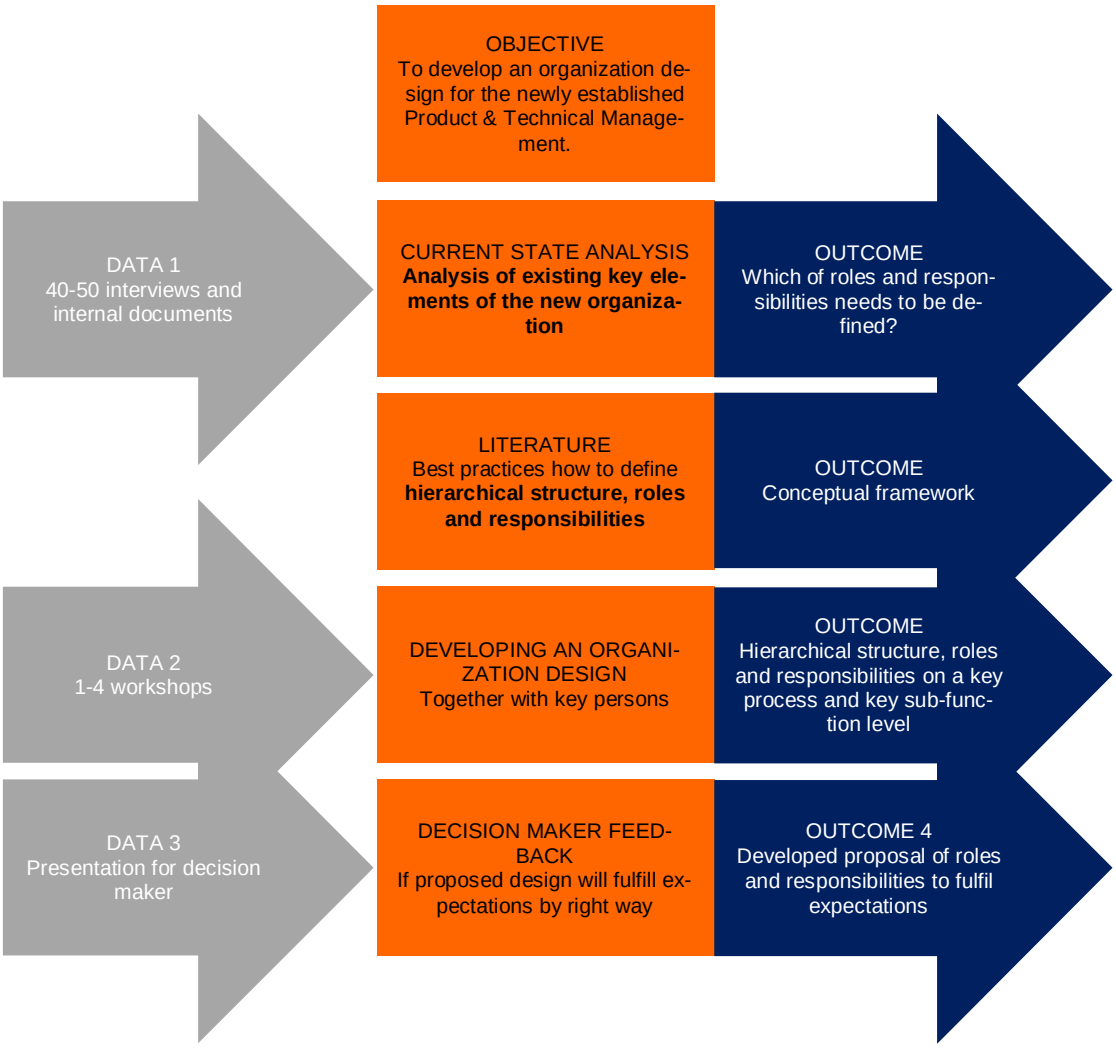


Figure 1. Research design in this study.

As seen from Figure 1, the research design of this study includes the following stages. First, Data 1 for the current state analysis investigates existing elements from old organization. The outcome clarifies scope of study in terms of the organization design. Second, literature search leads to a conceptual framework for building the organization design and for defining *processes*, *functions*, *roles*, *responsibilities* and *hierarchical structure* for the newly established organization. The outcome from the literature review creates a basis to design the organization. Third, Data 2 consists of different co-creation workshops in order to develop solutions for the organizational change. The outcome of this stage is the proposal for *processes*, *sub-functions*, *roles*, *responsibilities* and *hierarchical structure* for the newly established PTM organization. Fourth, Data 3 for validation of the developed proposal which is presented to the decision maker to give feedback before implementation.

2.3 Data Collection and Analysis

The data collection in this study is conducted in three rounds. First, the existing key elements of organization are identified. Second, the new solution for the newly established PTM organization is developed. Third, the feedback from the designers of the new organization is collected, in this case from the Director of EDG Services. The three data rounds are presented below, round by round.

First, Data collection 1 focused on identification of key existing elements of the organization. Data 1 was collected from two different sources: first, the company internal documents and then qualitative interviews. In addition to multiple interviews, meetings were also arranged in order to get more insight to the topic (see Table 3, Table 4, Table 5, Table 6 and Table 7). The interviews were mostly arranged via skype meetings and face-to-face meetings. Once the inputs from documents were reviewed, the interviews started.

Second, Data collection 2 was gathered to build the organization design in co-creation with the key stakeholders. Finally, Data collection 3 was conducted during the validation stage when the initial proposal received feedback and approval from the higher management. All three data collection are described in more detail below. Table 1 shows details of Data collection 1, for the current state analysis.

Table 1. Internal documents used in the current state analysis, Data 1.

	Title/type of the internal document	**Amount/ number of pages**	**Description**
A	Services Management Manual.docx	27 pages	The role of Services within the case company Corporation
B	4-s and SBO Technical Services and Information Procedures.docx	28 pages	Technical service and information processes for Services
C	Technical service and technical information procedures France.pdf	9 pages	Technical service and information processes for France
D	Product Management Procedures.doc	12 pages	The global way of working and process to be applied in area of Product Lifecycle Management
E	Services business process (intranet)	30 pages	Process descriptions from different levels of Services
F	MyVoice 2016_analyse par équipe - 4stroke_TS.xlsx	1 file	Employee satisfaction survey from old organization: consist of 85 questions
G	Organization chart of the EDG Services	1 file	Description of organization when second level has been appointed
H	4-Stroke Engine Services Organisation.ppt	128 slides	Organization chart of old organization
I	Services to set up one dedicated EDG Function under Product Line 4-Stroke Engine Services.pptx	15 slides	Description of purpose of PTM as a part of EDG Services
J	EDG Services MT Meeting PTM12017	14 slides	Organization chart when all person have joined to the team
K	PTM AUX project for ENGINE 4.pptx	13 slides	Description of work to be done for ENGINE 4 auxiliary equipment
L	Job Description in Artist system	4 pages	Recruitment of Product Manager EDG

As seen from Table 1, the study started from the governance of Services division (rows from A to E) and then moving to documents which describe *hierarchical structure* and purpose of EDG Services (rows from F to I). Finally, current state analysis utilized documents which were created in the newly established PTM organization (rows from J to L).

Once the input from documents was reviewed, the interviews started. In Data collection 1 (for the current state analysis) the researcher performed the analysis of own organization and interfaces of it. The interviews of the relevant employees started from the designers of the new EDG Services organization (see Table 3 rows 1-5) who have been working in the EDG business or business control. In the end, this the interviews were performed with the EDG Services management team members (see

Table 3 rows 6-10). These interviews led to identifying the key existing employees to be included into the new organization and to interview key persons who are interfaces for the newly established PTM organization.

There were three different groups of the employees formed when identifying persons to be interviewed: first, (a) there are employees who are fully dedicated to EDG business and are reporting to the researcher. Most of them were working for ENGINE 1 product supplying Technical services and Technical information in France. These employees were interviewed and called to meetings in the beginning of the current state analysis (see Table 4). The outcome of these interviews was list of new employees for interviews and meetings.

Second, (b) there were the employees who are still located in the old matrix organization. They work only part-time for the newly established PTM organization and they do not necessarily have experience in EDG business. Most of them were working for Technical services for auxiliary equipment (AUX), Product management for auxiliary equipment, Technical services for ENGINE 4, ENGINE 2 and ENGINE 3 products, Technical information for ENGINE 4, ENGINE 2 and ENGINE 3 products and Technical identification for ENGINE 1 products with their auxiliary equipment (see Table 5 and Table 6). Because the scope of study was the newly established PTM organization, these persons are not included to solution development.

Third, (c) there are several persons in the newly established PTM organization who can work also for the old matrix organization for other industry (or customer segment) (see Table 4). This means that many employees have *responsibilities* which do not serve the needs of the newly established PTM organization (these key employees with their *responsibilities* are included into the list of employees in Section 3.8).

Additionally, the employees from Operational Development, Service Unit and Quality management were interviewed (see Table 6).

Table 2 briefly summarizes the types and numbers of employees interviewed. The summary of field notes from the interviews is reported in written format in one Excel document (Appendix 1). All four groups of employees have a more detailed description below.

Table 2. Position and number of employees participated to interviews, Data 1.

	Position of interviewed people in organization	**Number of employees**
1	Designers of EDG Services	11
2	Reporting to the researcher in PTM	14
3	4-stroke Engine Services	18
4	Other	3

As seen from Table 2, it shows that the majority of interviews focused on interface towards 4-stroke Engine Services organization. The four groups interviewed for the current state analysis (Data 1) are described below. Table 3 shows the interviews conducted with the designers of EDG Services (Group 1).

Table 3. Details of interviews of designers of EDG Services (Group 1), Data 1.

	Function	**Data type**	**Position**	**Topic, description**	**Length (h)**	**Date**	**Documented as**
1	Product Management, 4-stroke Engine Services	Meeting	Director	Interview	1,5	14.10.2016	Field notes
2	Quality Management NS	Meeting	General Manager	Interview	1	11.10.2016	Field notes
3	Technical Services Management, 4-stroke Engine Services	Skype Meeting	Director Director	Interview	1	16.11.2016	Field notes
4	Business Control, 4-stroke Engine Services	Meeting	General Manager	Interview	1	16.11.2016	Field notes
5	Product Management, 4-stroke Engine Services	Skype Meeting	Director	Interview	1	10.2.2017	Recording Field notes
6	EDG Services	Meeting	General Manager	Interview	1	22.11.2016 30.11.2016	Field notes
7	Sales Management NS	Skype Meeting	General Manager	Interview	1	13.2.2017	Recording Field notes

8	Operations Management NS	Skype Meeting	General Manager	Interview	1	13.2.2017	Recording Field notes
9	Supply Management NS	Skype Meeting	General Manager	Interview	1	14.2.2017	Recording Field notes
10	EDG Services	Meeting	Director	Interview	1	28.2.2017	Field notes

As seen from Table 3, the interviews were conducted with designers of EDG Services (rows 1-5) who are in charge of 4-stroke Engine Services. This was done to clarify the experience, challenges and reasons for creation of EDG Services. The interviews also included the new leaders of EDG Services (rows 6-10), the colleagues of the researcher, and the Director of EDG Services. All of these persons were in the new position, this is why the interviews were performed two months later in order to give them time to become aware of their own organization and expectations towards the newly established PTM organization.

Next, as the researcher was appointed to the new position, interviews with his own organization started. Table 4 shows the persons interviewed in the newly established PTM organization (Group 2).

Table 4. Interviews of key persons in PTM (Group 2), Data 1.

	Function	Data type	Position	Topic, description	Length (h)	Date	Documented as
1	PTM	Meeting	Technical Superintendent	Interview	1	4.10.2016	Field notes
2	PTM	Meeting	Assistant	Interview	1	4.10.2016	Field notes
3	PTM	Meeting	Engine Expert	Interview	1	4.10.2016	Field notes
4	PTM	Meeting	Engine Expert	Interview	1	4.10.2016	Field notes
5	PTM	Skype Meeting	Technical Manager	Interview	1	28.11.2016	Field notes
6	PTM	Meeting	Product Manager	Interview	1	15.11.2016 17.11.2016	Field notes
7	PTM	Skype Meeting	Product Manager	Interview	1	21.11.2016 17.2.2017	Field notes
8	PTM	Skype Meeting	Technical Superintendent	Interview	1	29.11.2016	Field notes
9	PTM	Skype Meeting	Data Base Expert	Interview	1,5	30.11.2016 2.2.2017	Field notes
10	PTM	Skype Meeting	Design Engineer	Interview	1	30.11.2016	Field notes
11	PTM	Skype Meeting	Engine Expert	Interview	1	5.12.2016	Field notes
12	PTM	Skype Meeting	Design Engineer	Interview	1	5.12.2016	Field notes
13	PTM	Skype Meeting	Engine Expert	Interview	1	13.12.2017	Field notes
14	PTM	Skype Meeting	Senior Material Expert	Interview	1	20.12.2016	Field notes

As seen from Table 4, the interviews started with a visit in France and continued by skype meetings. The new EDG Services has important interfaces to old 4-stroke Engine Services, this is why the interviews continued also to old 4-stroke Engine Services. Table 5 shows the details of interviews.

Table 5. Interviews of key persons in 4-stroke Engine Services (Group 3), Data 1.

	Function	Data type	Position	Topic, description	Length (h)	Date	Documented as
1	Global Logistics Services, 4-stroke Engine Services	Meeting	Manager	Interview	2	12.10.2016	Field notes
2	Technical Services Finland, 4-stroke Engine Services	Meeting	Technical Engine Auxilliary Systems	Interview	1	15.11.2016	Field notes
3	Technical Services Investigation laboratories Italy, 4-stroke Engine Services	Skype Meeting	Manager	Interview	1	21.11.2016	Field notes
4	Technical Information Finland, 4-stroke Engine Services	Meeting	Manager	Interview	1	22.11.2016	Field notes
5	Product Management, 4-stroke Engine Services	Meeting	Design Manager	Interview	1	23.11.2016	Field notes
6	Technical Services Finland, 4-stroke Engine Services	Meeting	Technical Manager	Interview	1	23.11.2016	Field notes
7	Technical Services Italy, 4-stroke Engine Services	Skype Meeting	Product Manager Engine Expert	Interview	1	29.11.2016	Field notes
8	Technical Information Finland, 4-stroke Engine Services	Skype Meeting	Technical Information Manager Technical Information Manager Technical Identification Engineer	Interview	1	29.11.2016	Field notes
9	Technical Services Finland, 4-stroke Engine Services	Meeting	Manager	Interview	1	28.11.2016	Field notes
10	Technical Services Finland, 4-stroke Engine Services	Meeting	Technical Manager	Interview	1	5.12.2016	Field notes
11	Global Logistics Services, 4-stroke Engine Services	Skype Meeting	Trainee	Interview	1	19.12.2016	Field notes
12	Technical Information Finland, 4-stroke Engine Services	Meeting	General Manager	Interview	1	16.11.2016 10.1.2017	Field notes
13	Business Control, 4-stroke Engine Services	Meeting	General Manager	Interview	1	16.11.2016	Field notes
14	Technical Information Finland, 4-stroke Engine Services	Meeting	Manager	Interview	1	28.12.2016	Field notes

15	Technical Services Finland, 4-stroke Engine Services	Skype Meeting	General Manager	Interview	1	10.1.2017	Recording Field notes
16	Product Management, 4-stroke Engine Services	Skype Meeting	Director	Interview	1	10.2.2017	Recording Field notes

As seen from Table 6, the interviews included the 4-stroke Engine Services located in Italy (rows 3 and 7) and in Finland (all expect rows 3 and 7).

In addition, other new key persons were interviewed to understand the scope of organizational change. Table 6 shows interviews which could not be allocated to the previous categories.

Table 6. Interviews of other key persons (Group 4), in Data 1.

	Function	**Data type**	**Position**	**Topic, description**	**Length (h)**	**Date**	**Documented as**
1	EDG Deliveries, Marine Solutions	Meeting	Manager	Interview	1	12.10.2016	Field notes
2	Indirect Purchasing and Travel Management, the case company France	Skype Meeting	Manager	Interview	6	4.10.2016 14.11.2016 15.11.2016	Field notes Recording
3	Area Business Support	Skype Meeting	General Manager	Interview	1	14.2.2017	Recording Field notes

As seen from Table 6, the interviews included Marine Solutions to clarify if quality inspectors should be located in the new PTM or in Quality Management function of EDG Services. Service Unit France included a few key persons who had extensive experience of this background in the previous organization.

In addition to the above interviews that were arranged individually, some of them combined several persons into the interviews. Table 7 shows the list of such meetings.

Table 7. Details of meetings, in Data 1.

	Function	Data type	Position	Topic, de-scription	Length (h)	Date	Documented as
1	Energy Solutions	Skype Meeting	Several	Discussion about SPC / O&M manual process	0,5	10.1.2017	Field notes
2	4-stroke Engine Services	Skype Meeting	Several	Technical Identification for ENGINE 1	1	14.12.2016 17.1.2017	Recording Field notes
3	4-stroke Engine Services	Skype Meeting	Several	Resourcing for ENGINE 4	1	9.1.2017	Field notes
4	Business Control	Skype Meeting	Several	WFR TS EDG hand over preparation	1	7.12.2016	Recording Field notes
5	EDG Services	Skype Meeting	Several	EDG customer feedback meeting	1	17.2.2017	Field notes
6	PTM	Skype Meeting / Location A	Several	Product and Technical Management Team Meeting 2/2017	2	23.2.2016	Field notes
7	PTM	Skype Meeting	Several	Product and Technical Management Team Meeting 3/2017	2	23.3.2017	Field notes
8	EDG Services	Skype Meeting	Several	Audit findings	1	9.2.2017	Field notes
9	4-stroke Engine Services	Skype Meeting / CR Jupiter	Several	TVO Engine Documenta-tion / w-o-w questions from the TVO pro-ject	2	20.2.2017	Field notes
10	4-stroke Engine Services	Skype Meeting	Several	Seismic Qualification	1	30.1.2017	Field notes

As seen from Table 7, meetings related to the *responsibilities* in technical identification, manuals and qualification (rows 2 and 10). Meetings were also arranged to identify the role of EDG Services when delivering new projects together with Energy Solutions (rows 1, 3 and 9). Contacts to the external customer and authority expectations were also performed by utilizing the meeting with participants from Quality Management and Sales Management *functions* of EDG Services.

Next, in Data collection 2 (proposal building) another round of interviews, meetings and co-creation workshops was conducted. Table 8 shows Data collections 2 related to the creation of solution and collection of feedback.

Table 8. Data collection from workshops, Data 2.

	Participants / role	**Data type**	**Topic, description**	**Date, length**	**Documented as**
1	Participants: - Chief Design Engineer, External - Design Engineer, External - Product Engineer, External - Product Engineer, Technology, Marine Solutions - Product Manager ENGINE 4/ENGINE 2	Workshop, Location C	Proposal building for ENGINE 4, ENGINE 3, ENGINE 2 and auxiliary components.	12.4.2017 1 h	See table
2	Participants: - Assistant - Senior Design Engineer - Design Engineer - Engine Expert Location A*2 - Product Manager ENGINE 1 - Senior Material Expert - Technical Superintendent	Introduction meeting for workshop, Location A and skype meeting	Introduction meeting for proposal building workshops for ENGINE 1	19.4.2017 0,5 h	See table
3	Participants: - Assistant - Senior Design Engineer - Design Engineer - Engine Expert Location A - Product Manager ENGINE 1 - Senior Material Expert - Technical Superintendent	Workshop, Location A and telepresence meeting	Proposal building for ENGINE 1: background of the organization design, processes, roles and responsibilities	21.4.2017 3 h	See table
4	Participants: - Assistant - Senior Design Engineer - Design Engineer - Engine Expert Location A - Engine Expert Location B - Product Manager ENGINE 1 - Technical Superintendent	Workshop, Location B and skype meeting	Proposal building for ENGINE 1: background of the organization design, processes, roles and responsibilities, functions, structure	24.4.2017 3 h	See table

As seen from Table 8, the first co-creation workshop (row 1) included only *processes* and *responsibilities* taking place in Location C, Finland. Conceptual framework and Thesis process was reviewed in the beginning of the co-creation workshop. Then, *processes*,

roles and *responsibilities* for a *process* of Spare Part Bill of Materials for auxiliary components were agreed. The following co-creation workshops were prepared more beforehand because the scope of work included all other *processes*. Second, an introduction meeting (row 2) for all employees locating in Location A, France was held. Even the result of the current state analysis was shared with employees of the newly established PTM organization, the next step was to get employees more aware of the findings. The researcher sent a draft of personal *responsibilities* of each employee as an e-mail attachment. The purpose of this draft was to prepare every employees for the co-creation workshops. Third, co-creation workshop (row 3) was held focusing mainly on *processes*, *roles* and *responsibilities* for people who located in Location A, France. The fourth co-creation workshop (row 4) focus mainly on *sub-functions* and *hierarchical structure* of the newly established PTM organization and was held in Location B, France.

In Data collection 3, after the proposal for the organization design was finalized, the validation session was conducted with the higher management. Table 9 shows the third data collection phase of this study.

Table 9. Data collections related to the collection of feedback, Data 3.

	Participants / role	**Data type**	**Topic, description**	**Date, length**	**Documented as**
1	Director, EDG Services	Discussion	Validation, evaluation of the proposal	24.4.2017 1 h	Field notes Section 6
2	Director, EDG Services	Discussion	Validation, evaluation of the proposal and the next steps	25.4.2017 1 h	Field notes Section 6
3	Director, EDG Services	Discussion	Validation, comparison between expectations and proposal	2.5.2017 2 h	Recording Section 6

As seen from Table 9, the Director of EDG Services reviewed the steps which lead to proposed *hierarchical structure* of the newly established PTM organization. The comments were documented in the field notes and changes for the *hierarchical structure* was made.

3 Current State Analysis of Key Existing Elements for the New Organization

This section identifies and analyzes the key existing elements for the newly established organization. First, the section gives an overview of the current organizational change from the old 4-stroke Engine Services to the newly established PTM organization. Next, the current state analysis clarifies the existing *processes, functions, roles* and *responsibilities*. After this, expectations from designers of EDG Services and authorities are analyzed. Finally, the last sub-section summarizes the findings of revealed in the analysis.

3.1 Overview of the Current State Analysis Stage

The current state analysis stage focused on exploring the existing elements (from the previous organization – the old 4-stroke Engine Services) what will be used for building the new organization (the newly established PTM organization).

First, the analysis started with the overview of the background of the new organization. After that, the analysis focused on exploring the internal documents and interviewing the employees in the old 4-stroke Engine Services and the newly established PTM organization. The identification of existing *processes* started by reviewing the existing process descriptions and internal documentation.

Second, the analysis proceeded to the interviews with the EDG Service Designers (Group 1) in the first place. This analysis aimed at identifying the key expectations for the newly established PTM organization and the existing key elements of the old 4-stroke Engine Services and the newly established PTM organization. The expectations for the new organization were discussed and grounded for the new organization design. This way the current state analysis started by interviewing the leaders who already had experience and vision for the new organization.

After that, the current state analysis zoomed into the key elements for the newly established PTM organization. In this stage, the interviews were the major source of information.

Third, the identification of *sub-functions* was done by reviewing existing the first organization charts of EDG Services and organization charts of 4-stroke Engine Services. Meetings with Energy Solutions also helped to identify the need for the *sub-functions*.

Fourth, the identification of *responsibilities* was done by interviews and meetings. This section was the most challenging of all data sources because of huge amount of *responsibilities*.

Fifth, the identification of *roles* and employees was done by utilizing the first organization charts of EDG Services.

Summing up, Data 1 was collected by (a) exploring the internal documents, (b) interviewing the identified key employees to get more details regarding the organization's specific areas; (c) third, conducting meetings; for example, the researcher selected the three most important findings of employee satisfaction survey from 2016 with the PTM organization employees into the current state analysis.

3.2 Background of the Case Organization

When announcing the organizational change, the following statement was given to the new unit (Internal documentation: Services to set up one dedicated EDG Function under Product Line 4-stroke Engine Services.pptx):

> *With the dedicated unit and personnel, the focus on quality, competence, compliance to regulation and customer requirement understanding will become more visible to our customers and contribute to the certainty of operations over the complete lifecycle.*

This means the organizational change did not include any process changes. The changes took place in reporting lines for employees who worked mainly for EDG business. This is why their *responsibilities* may change.

The newly PTM organization supplies Technical services, Technical information and Product management services as an owner of engine products over the whole lifecycle of the products. The case company Services focus especially on engine products, but also their auxiliary equipment are included in the scope of services. Scope of engine

product is defined as follows: all the components rigidly mounted on the common base frame excluding the generator. Accordingly, flexible connections from the common base frame are part of auxiliary equipment.

Figure 2 shows 4-stroke Engine Services before the organizational change. Figure 2 shows matrix organization where seven different *functions* (orange) were serving the EDG business. Four different areas (blue) are serving customers in the different location. Numbers in the boxes define the number of employees that was interviewed in the course of the current state analysis.

After that, Figure 3 shows 4-stroke Engine Services after the organizational change, and more specifically, Figure 4 shows EDG Services organization after the organizational change.

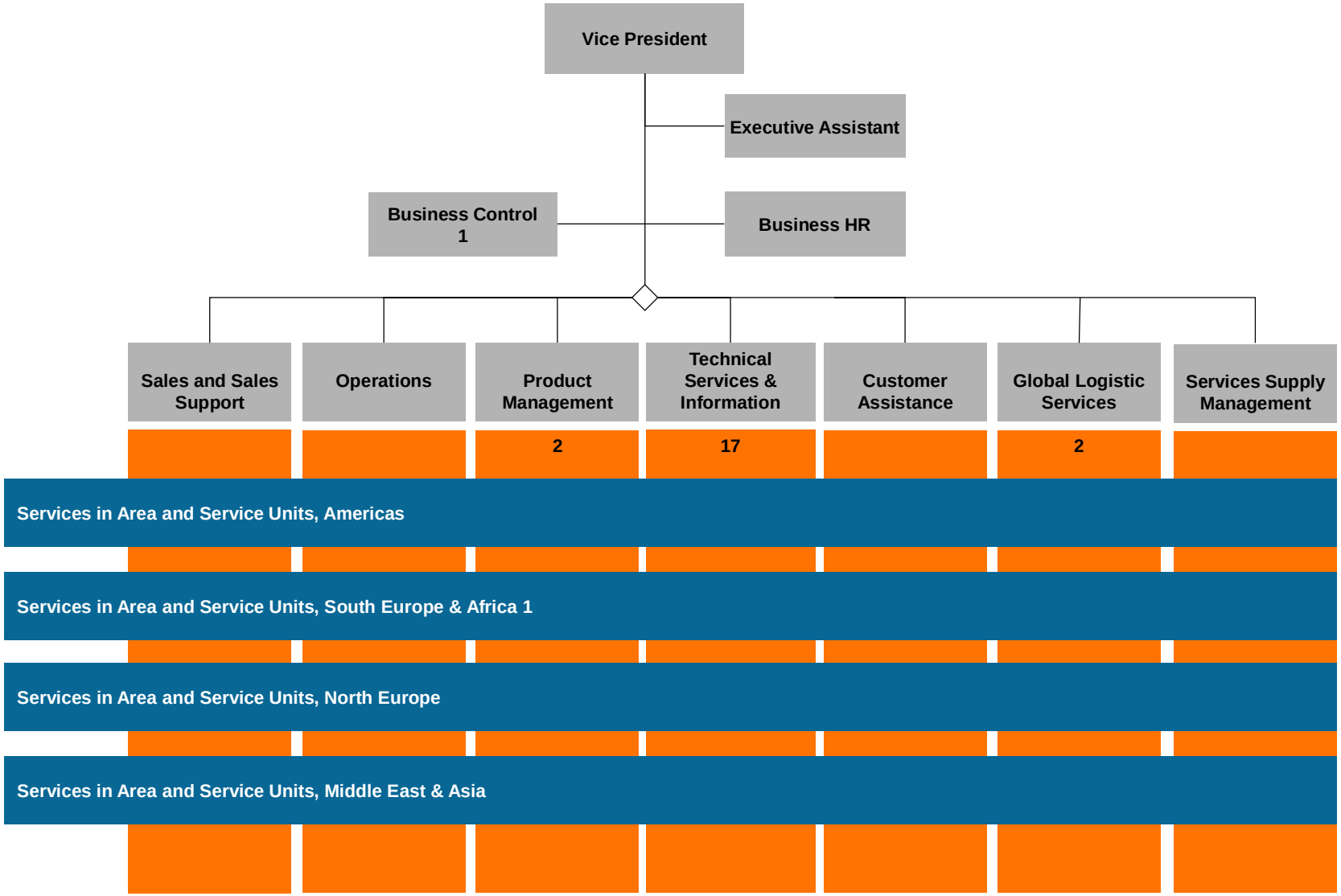


Figure 2. 4-stroke Engine Services (before the organizational change).

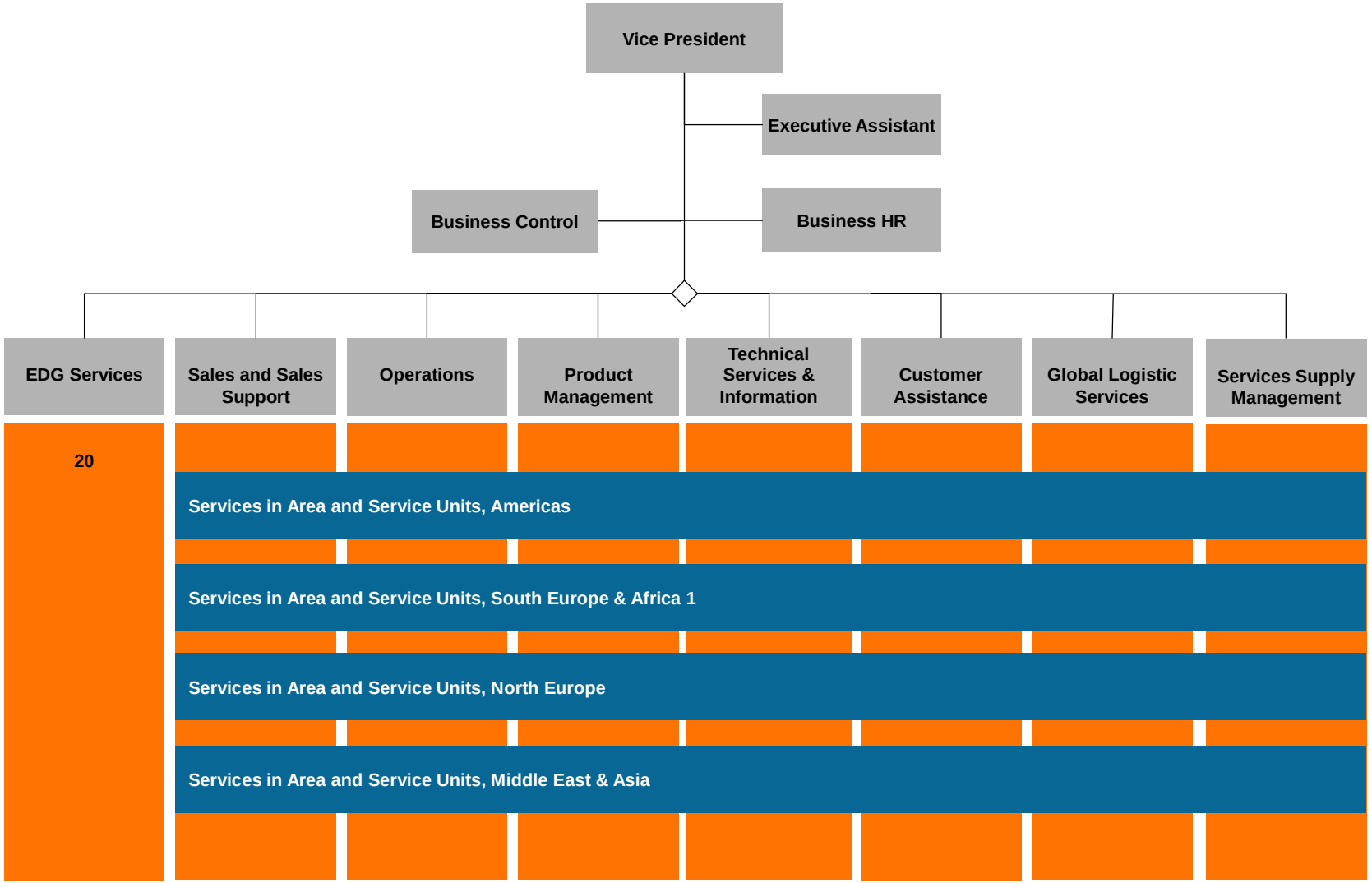


Figure 3. 4-stroke Engine Services (after the organizational change).

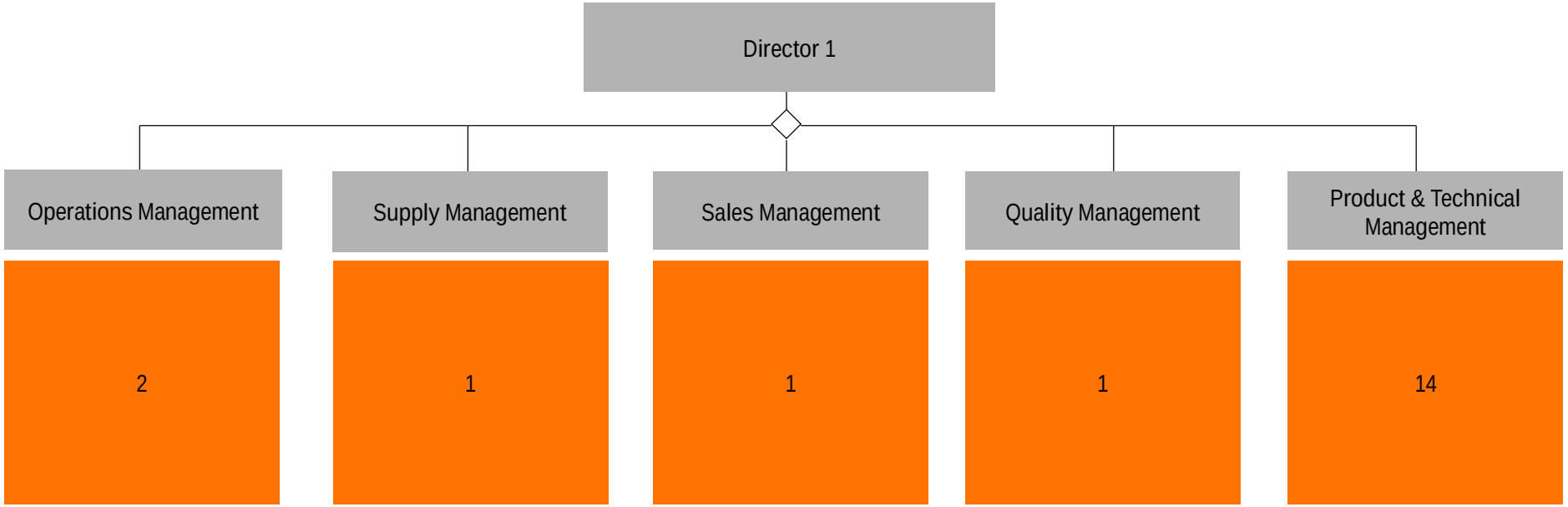


Figure 4. EDG Services (after the organizational change).

As seen from Figure 3, the matrix organization has eight different *functions* (orange). Part of the employees working for EDG business in four different areas (blue) have been moved to this new function called EDG Services. Numbers in the boxes define the number of employees that was interviewed in the course of the current state analysis.

Figure 4 shows EDG Services organization where five different *functions* (orange) are shown. All the employees working full-time for EDG business belong to this organization. Numbers in the boxes define the number of employees that was interviewed in the course of the current state analysis.

3.3 Identifying Expectations from the Designers of the EDG Services

The interviews to identify expectations to be taken into account when developing the newly established PTM organization stated from 11 different leaders who are or have been in the position of General Manager or Director for Technical Service, Technical Information or Product Management of the old 4-stroke Engine Services or who are part of EDG Services management team.

Based on the results from the interviews with the designers, the expectations were divided into four parts below. Table 10 below summarizes the expectations for the newly established PTM organization.

Table 10. Expectations for the newly built PTM organization.

	Relates to	**Expectations**
1	Processes	*creating* an organization and creating clear roles to avoid too much process related way of working
2	Processes	*making sure* of the use of common tools of 4-stroke Engine Services: Technical Request and Bulletins
3	Processes	*ensuring* correct use of Technical Request tool and consider other processes for long term projects
4	Sub-functions	*creating* an organization which change focus from the products to the customers
5	Sub-functions	*improving* management of people together with Location B factory

6	Sub-functions	*considering* to recruit manager to look over tasks completed in Location B and Location A
7	Roles and responsibilities	*leading* the big picture of EDG activities in Services and using resources from 4-stroke Engine Services according to needs of EDG business
8	Roles and responsibilities	*clarifying* work effort for ENGINE 4, ENGINE 2 and ENGINE 3 and built size of organization accordingly
9	Roles and responsibilities	*agreeing* roles and responsibilities for electrical and automation of ENGINE 4, ENGINE 2 and ENGINE 3
10	Roles and responsibilities	*defining* global roles and responsibilities in order to make sure organization is not too fragmented
11	Roles and responsibilities	*improving* co-operation and team spirit in Location B with PTM and Operations Management NS for average delivery of EDG engines of 4 months and 2 week
12	Structure	*creating* long term plan for PTM that the replacements and the new employees for ENGINE 1 locate in Location B
13	Structure	*improving* the French organization to carry responsibility and create visibility to activities taking place in France
14	Structure	*utilizing* organizational change and position of GM of PTM having authority to decide

As seen from Table 10, the key expectations from the designers point to four areas. First of all, they relate to the role of the newly established PTM organization in the case company (see rows 1-3 to *processes*, 4-6 to *sub-functions*, 7-11 to *roles* and *responsibilities* and 12-14 to *hierarchical structure*).

As one of designers stated, the expectations were summarized in the following words:

> *"Keep in mind that everything is project or customer specific compared to standard engines." (Director, EDG Services)*

In relation to the organization design for the newly established PTM organization, the following expectations were identified as the guiding principles for building the new organization: first, *processes* should not be too detail. Second, management of Location B' *sub-functions* shall be re-defined. Third, fragmentation of organization had made *roles*

and *responsibilities* unclear. Fourth, Services wants to have more visibility to the activities taking place in France. These principles were used to guide the investigation for: (1) the *processes* for the newly established PTM organization, (2) its *functions*; (3) its *roles* and *responsibilities*, and (4) *hierarchical structure*.

As one of designers stated, the expectations can be summarized in the following words:

> *"The new organization has to be PAF = Positive, Agile and Flexible – this is what we need!" (Director, Product Management, 4-stroke Engine Services)*

The second part of results from the designers' interviews described the expectations for *the interfaces* with the other *functions*. These expectations are excluded from the scope of this study. Table 11 summarizes expectations for interfaces.

Table 11. Expectations for the interfaces of EDG Services.

	Relates to	**Expectations**
1	Interfaces	*creating* the end-to-end organization in PTM for EDG Services including processes, ways of working, mode of operation in co-operation to the other Shared Business Operations functions in Services
2	Interfaces	*defining* who and how adjusts Spare Part prices to match with volume of delivered spare parts for a specific customer
3	Interfaces	*defining* roles, responsibilities, co-operation and clarifying work effort with other functions of 4-stroke Engine Services (for the ENGINE 4, ENGINE 2 and ENGINE 3 products for EDG activities)
4	Interfaces	*focusing* especially on the processes which are EDG specific such as Bulletins and Qualification
5	Interfaces	*ensuring* communication with QuantiParts, despite of own EDG Services organization, because they use of same material numbers with ENGINE 1 EDG products
6	Interfaces	*communicating* the expected design changes *before* the change is implemented and *deciding* together *what* changes will be implemented, in order to minimize the number of Bulletins
7	Interfaces	*keeping* the customer and authority specific heavy qualification and quality processes (Country 1) separately from light (Country 2) one

8	Interfaces	*defining* the way of working, roles and responsibilities for missing Qualification process
9	Interfaces	*defining* the owner of Root Cause Analysis in Location B factory
10	Interfaces	*improving* communication with Life Cycle Support because Level 1 Technical Requests are handled there
11	Interfaces	*considering* Life Cycle Support as a sellable solution and create organization which make profit during the next 30 years
12	Interfaces	*participating* systematically in the sales process from the beginning till the end
13	Interfaces	*participating* in the creation of Inspection and Test Plans

As seen from Table 11, the expectations consider many different *functions* inside Services division. This means that management of interfaces is the most challenging part for whole EDG Services organization.

As one of designers stated, the expectations were summarized in the following words:

> *"EDG purchasing order went via 14 organization in 2013." (General Manager, EDG Services)*

Finally, the message from the designers of the EDG Services can be summarized in three major points: First, factory in Location B defines requirements for organization locating in France. Second, the EDG Services has to take the leading role in all activities and communication towards 4-Stroke Engine Services. Third, Shared Business Operations offer tools for sharing and solving the technical issues, but EDG Services is currently missing process to qualify a new designs for EDG business. Finally, the *processes* should not be defined on a too detail level in order to keep EDG Services an agile organization.

3.4 Identifying Expectations from External Customers and Authorities

The analysis also looked into the external customers and authorities' expectations for the newly established PTM organization. Importantly, the newly established PTM organization is not responsible for the straight connections to the customer. This is why official customer survey feedback were excluded from the current state analysis. On the other hand, the EDG authorities of the business have significance for the newly established PTM organization because they secure implementation of EDG safety aspects in the organization. Therefore, the latest audit result from the customer audit were used as an input for this analysis. In these results, only two out of four *processes* of the newly established PTM organization contained related findings. Table 12 summarizes expectation from external customers and authorities.

Table 12. Expectations from the external customers and authorities EDG Services.

	Relates to	**Expectations**
1	Roles and responsibilities	*defining* the roles, responsibilities and competence requirements in Bulletins process
2	Interfaces	*defining* the roles and responsibilities to manage customer specific Engine Bill of Materials
3	Interfaces	*defining* the roles and responsibilities for qualification, especially seismic qualification and customer specific component safety classification

As seen from Table 12, external customers and authorities can be seen as two different issues: first, they expect that all the employees in change of Bulletins have proper competencies for the work. Second, they pay attentions to get more customer specific service because qualification of design as well as Engine Bill of Materials are very much depend on customer specific requirements and service history.

Summing up, the expectations from the designers of EDG Services (as well as - *to some extent* - from the external customers and authorities) were summarized into various categories of expectations in Sections 3.3 and 3.4 above. Those expectations which related to *the organization design* for the newly established PTM organization, and could be considered as the guiding principles for building the new organization, mainly related to

the following four elements: first, *(1) the processes* for the newly established PTM organization; second*, (2) the functions* of the newly established PTM organization, third, *(3) the roles and responsibilities* in the newly established PTM organization, and finally *(4) the hierarchical structure* of the newly established PTM organization.

These expectations were used in the next part of the current state analysis to guide the investigation for: (1) the *processes*, (2) its *functions*, (3) its *roles* and *responsibilities*, and (4) *the hierarchical structure* for the newly established PTM organization, as discussed separately below.

3.5 Identifying Key Existing Processes

The newly established PTM organization is created from the *processes* and employees belonging to Product Management, Technical Information and Technical Services *functions* of 4-stroke Engine Services. The 4-stroke Engine Services has established general *processes* which are called Shared Business Operations. The purpose of these *processes* is to secure best practice and way of working within the case company Services. The case company Services' worldwide network is called Services Units which has always the main customer responsibility. (Internal documentation: Services Management Manual.docx; 4-s and SBO Technical Services and Information Procedures.docx; Product Management Procedures.doc; Services business process (intranet)) Demanding and unique customer requirements have required the case company Services to establish process descriptions for some of *processes* taking place in the case company France. (Internal documentation Technical service and technical information procedures France.pdf) Figure 5 shows the identified *processes*.

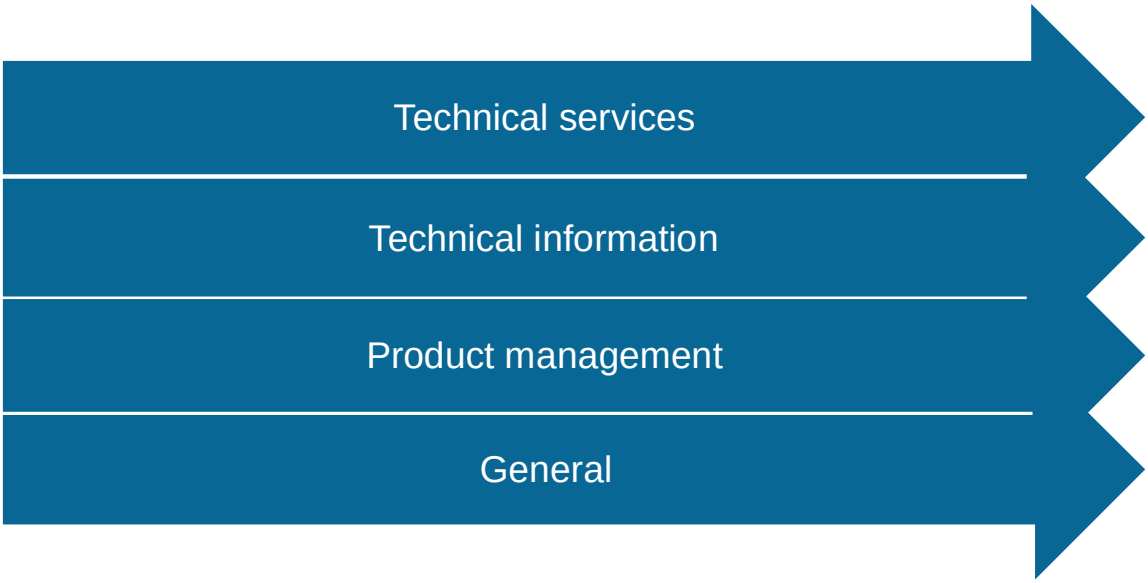


Figure 5. Key processes in PTM.

As seen from Figure 5, there are *processes* of the newly established PTM organization. Importantly, Figure 5 includes only those *processes* discussed in the interviews and meetings held for the current state analysis. This is done because the current state analysis is focused especially on employees affected by the organizational change. This means that *processes* which are common for Shared Business Operations (but not used in EDG Services organization today), are not presented in this figure.

First, the process called Technical services includes technical support to other *functions* and to customers. Internally, technical support helps other *functions* to complete their *processes* such as selling of spare parts. Externally, technical support helps customers to operate engine products in proper way in exceptional cases. Technical Service function of 4-stroke Engine Services has dedicated product groups for different engine products and one group responsible for auxiliary equipment for all engine products. This means that Technical Service function of 4-stroke Engine Services is responsible for technical content to be communicated to customer, but it is another process, Technical Information, that is responsible for the format of information. Technical information in the documents should explain how to operate, repair, maintain and overhaul engine products and their auxiliary equipment. (Internal documentation: 4-s and SBO Technical Services and Information Procedures.docx)

Second, the process called Technical information includes creation of drawings and specifications and different manuals for external customers. The term *Service Bulletins*

(later on *Bulletins*) includes all the used *processes* to manage and communicate changes of work instructions, specifications and drawings for customer. (Internal documentation: 4-s and SBO Technical Services and Information Procedures.docx)

Third, the process called Product management includes strategical planning and commercial topics. The role of Product Management of 4-stroke Engine Services is to maintain the lifecycle strategy for different products and services in different stages of lifecycle. Product Management of 4-stroke Engine Services covers also possible product improvement and pricing *processes*. (Internal documentation: Product Management Procedures.doc)

In case of technical questions, the Service Unit is supplying Level 1 support to the customer. If more demanding support is needed, Service Unit changes Level 1 request to Level 2 request which is threated by the Technical Services of 4-stroke Engine Services. (Internal documentation: 4-s and SBO Technical Services and Information Procedures.docx)

Finally, the process presented at the bottom is called *General.* It is not actual a process, the term is used to collects all kinds of supportive and administrative *responsibilities* under one category. The next sections analyze *functions* and *responsibilities* under each process in more detail.

3.6 Identifying Key Existing Functions

The identification of the existing *functions* needed to deliver to customer was performed starting from *sub-functions* of the newly established PTM organization from the existing organization charts for EDG Services and then by interviews and meetings. (Internal documentation: EDG Services MT Meeting PTM12017; Organization chart of the EDG Services; PTM AUX project for ENGINE 4.pptx) Figure 6 shows existing *sub-functions*.

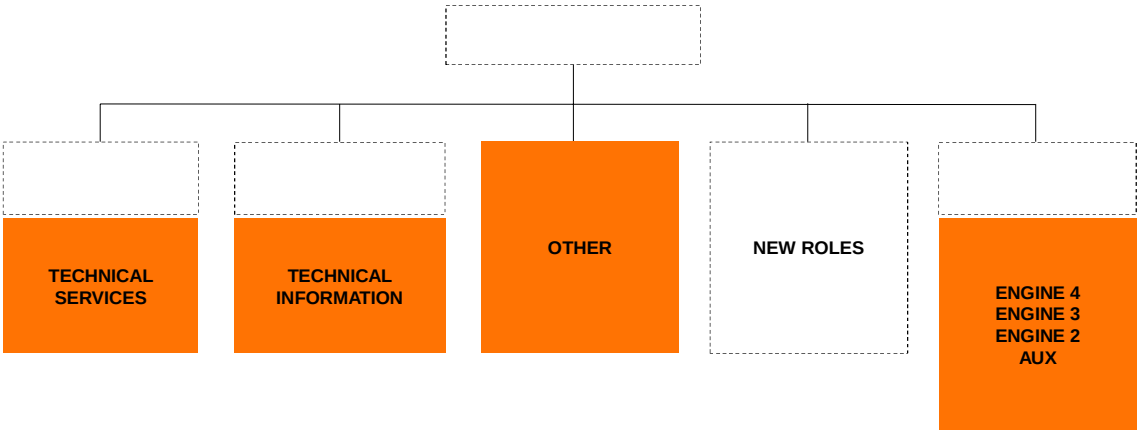


Figure 6. Key identified sub-functions for PTM.

As seen from Figure 6, it shows five different *sub-functions* (orange) established from different sources. Starting from left, first, the newly established PTM organization has a similar own Technical Services sub-function like the old 4-stroke Engine Services does have. Second, the newly established PTM organization has a similar own Technical Information sub-function like the old 4-stroke Engine Services does have. Third, the function called other includes different type of *roles* which are merged to the newly established PTM organization without supervisor. This means that they report for the researcher straight away. Fourth, the first announcement from year 2016 included possible new *roles* to be opened in the newly established PTM organization, including *roles* such as Pricing Manager and Product Experts. The figure shows possible new *roles* that management of 4-stroke Engine Services suggested. Fifth, during the current state analysis phase discussions about urgent needs lead to additional resources, including Product Manager from old 4-stroke Engine Services and external resources for ENGINE 4, ENGINE 3, ENGINE 2 and Auxiliary equipment who work part-time for the newly established PTM organization.

The identification of the existing *functions* needed to deliver to customer continued by interviews and meetings. The researcher investigated the *functions* and the location of this employee in the organization. In every interview, there was also a special question of interfaces. Questions for the interviews are listed in Appendix 1. Table 13 shows the functions of the identified people.

Table 13. Key identified functions for PTM.

Number	Function
1	Area Business Support
2	Area Sales Management
3	Area Sales Support
4	Business Control EDG
5	Business Control Product Management, 4-stroke Engine Services
6	Business Control Technical Services and Technical Information, 4-stroke Engine Services
7	Business Control, 4-stroke Engine Services
8	Contract Management, Operations Management EDG
9	Design, Analysis and Expertise, Technology, Marine Solutions
10	External
11	Field Services, Operations Management EDG
12	Global Logistics Services, 4-stroke Engine Services
13	Human Resources Services
14	Indirect Puchasing and Travel Management, Corporation France
15	EDG Deliveries, Marine Solutions
16	EDG Services
17	Operations Management EDG
18	Operations Management, 4-stroke Engine Services
19	Part Coordination Management, Sales Management EDG
20	Product Management, 4-stroke Engine Services
21	Project Management, Energy Solutions
22	Project Management, Operations Management EDG
23	Project Quality & Documentation, Energy Solutions
24	PTM
25	Quality Management EDG
26	QuantiParts
27	Sales Management
28	Sales Management and Development
29	Sales Management EDG
30	Supply Management EDG
31	Supply Management, Corporation
32	Technical Information Finland, 4-stroke Engine Services
33	Technical Information Italy, 4-stroke Engine Services
34	Technical Information Norway, 4-stroke Engine Services
35	Technical Services Finland, 4-stroke Engine Services
36	Technical Services Investigation laboratories Italy, 4-stroke Engine Services
37	Technical Services Italy, 4-stroke Engine Services
38	Technical Services Management, 4-stroke Engine Services
39	Corporation Quality Management

As seen from Table 13, the list of *functions* includes all the *functions* identified in the interviews and meetings (the employees not reporting to the researcher). In total, 38 other *functions* were identified. Often, instead of name of employee, the name of organization was mentioned because the interviewee could not point out to a specific name of the employee.

The next section discusses about the existing *responsibilities* (in Section 3.7) and then the *roles* (in Section 3.8) in the newly established PTM organization related to these *functions*.

3.7 Identifying Key Existing Responsibilities

Identification of the existing *responsibilities* needed to deliver to customer was done by interviews and meetings. Questions for the interviews are listed in Appendix 1. The identified *responsibilities* are split according to the four *processes*.

Table 14 shows only *responsibilities* which are clearly requested to be performed by employees reporting to the researcher in the Technical services process.

Table 14. Responsibilities in process to deliver Technical services in PTM.

Key Process	Responsibilities
Technical services	Approve Inspection Quality Plan with Hold Points & Withness Points
	Call seminar to share information regarding welds, investigations etc.
	Prioritize between non EDG Root Cause Analysis and EDG Root Cause Analysis
	Communicate EDG electrical and automation Obsolecence Management issues with Technical Service 4-stroke Engine Services
	Communicate with Operations Management
	Create welding specifications (books)
	Ensure availability of experts from Finland to participate to Root Cause Analysis
	Ensure communication over all investigation laboratories
	Ensure expert support from Finland (Marine Solutions, Energy Solutions, Services)
	Give support for users of Apollo Root Cause Analysis tool (Key user)
	Give support for users of Technical Request tool (Key user)
	Participate to customer feedback meeting
	Perform material investigations
	Perform Root Cause Analysis
	Prioritize between Root Cause Analysis, Technical Request and Sales Support
	Prioritize between non EDG investigations and EDG investigations
	Prioritize Technical Requests
	Prioritize Technical Support between for non EDG engines and EDG engines
	Prioritize Technical Support requests between dismantling, sub-assembly, assembly, FAT, Life Cycle Support, Project Management and customer in Location B.
	Technical Support for Bulletins
	Technical Support for Commercial Grade Dedication
	Technical Support for electrical and automation of ENGINE 4
	Technical Support for Field Service and customers (Governor Training)
	Technical Support for Life Cycle Support
	Technical Support for selling of auxiliary components
	Technical Support for Service Unit France
	Technical Support for Location B factory
	Technical Support for Technical Identification
	Technical Support for validation of new suppliers
	Technical Support for ENGINE 5/ENGINE 6
	Technical Support to supplier's questions origin from Purchase Order

As seen from Table 14, the *responsibilities* in the Technical services *processes* are related to technical support requested by end customers or to support requested by Location B factory.

Table 15 summarizes the *responsibilities* in Technical information processes.

Table 15. Responsibilities in process to deliver Technical Information in PTM.

Key Process	Responsibilities
Technical Information	Check engine components (master data, 3D, 2D drawings and other specifications)
	Collect technical information including 3D models, drawings and specifications about auxiliary components
	Collect technical requirements and translate them into specifications
	Coordinate documentation work with engineering partner
	Create drawings in Pro Engineer
	Create Bulletins
	Create drawings in Medusa
	Create drawings in Pro Engineer
	Create indirect purchasing material numbers in SAP
	Create material numbers for spare parts and spare part kits
	Create EDG material numbers in SAP
	Create EDG material numbers in Teamcenter
	Approve content to be communicated for EDG customers
	Define list of spare parts to be delivered with supplier taking into account profit, delivery time and cost
	Distribute Technical Request
	Ensure design and documentation work according to plans and time schedules
	Create and up-date supplier specific Balance of Plant Excel
	Ensure involvement of Services people (Energy Solutions contract)
	Ensure smooth communication with suppliers and 4-stroke Engine Services
	Ensure that Documentation Engineers and Design Engineers follow general international standards and the case company guidelines and standards
	Ensure that maintenance schedule match to available spare parts and work instructions
	Ensure that EDG quality requirements are connected to specification and drawings
	Ensure that Services get project related document from Energy Solutions
	Ensure that technical requirements are collected and translated into specifications and drawings
	Ensure that the documented information is correct in terms of content, quality and functionality
	Establish monthly status report (Energy Solutions contract)
	Follow and control budget for work to be done for Spare parts (Energy Solutions contract)
	Follow and control budget Spare Parts (Energy Solutions contract)
	Follow and control schedule for Spare Parts (Energy Solutions contract)
	Follow general international standards and the case company guidelines and standards
	Give support for users of SAP (Key user)
	Guide implementation EDG Services spare part strategy
	Maintain qualification together with EDG Services Quality Management
	Mentor and training on job to Documentation Engineer and Design Engineer
	Perform design and documentation work according to plans and time schedules
	Perform design and documentation work in order to maintain the existing products and solutions
	Perform Technical Identification
	Plan, schedule, manage cost and report status for creation of drawings and specification
	Prioritize between customers
	Prioritize Technical Requests
	Revise EDG material numbers in SAP
	Up-date Operation and Maintenance Manuals
	Up-date Spare Part Catalogue

As seen from Table 15, the *responsibilities* in the Technical information *processes*. The *responsibilities* relate to creation of drawings, Bulletins and manuals. Projects related to ENGINE 4 gave many requirements to this process.

Next, Table 16 summarizes the *responsibilities* in Product Management *processes*.

Table 16. Responsibilities in process to deliver Product management in PTM.

Key Process	Responsibilities
Product management	Act as product spokesperson in relevant internal, cross-divisional and external forums
	Clarify EDG requirements for 4-stroke Engine Services
	Communicate business opportunities over 4-stroke Engines (profitability, internal selling)
	Communicate business opportunities over EDG Services organization (profitability, internal selling)
	Create a product roadmap
	Define Spare Part Catalogue strategy
	Define Spare Part prices for different EDG customers
	Define Spare Part strategy
	Develop and maintain obsolescence and design change management processes together with other product managers
	Develop, maintain and communicate the long term strategy for own products
	Ensure communication with Customer Assistance Centre, Technical Services, Technical Information, Product Management and Pricing of 4-stroke Engine Services
	Ensure sales support for ENGINE 4, ENGINE 2, ENGINE 3 and auxiliary components
	Ensure smooth communication between divisions and engineering partners
	Ensure that product master data is suitable for an existing sales tools and processes
	Prioritize with Sales Management (identify customer needs: annual overhauls, out takes)
	Improve continuously product management processes and tools of Shared Business Operations for global EDG Services organization
	Lead auxiliary team which implement to EDG Services spare part strategy
	Maintain or improve the commercial performance of own products
	Manage customer specific requirements in Polarion
	Participate in feasibility studies and relevant market analysis for own product
	Participate in technical and commercial meetings with customers

As seen from Table 16, the *responsibilities* in the Product management *processes* relate to strategical decisions issued for the newly established PTM organization and communication to other *functions* in the old 4-stroke Engine Services.

Finally, Table 17 summarizes the *responsibilities* in part of General *processes*.

Table 17. Responsibilities in process to deliver General in PTM.

Key Process	Responsibilities
General	Approve travel reports
	Approve travel requests
	Approve vacation requests
	Call monthly meeting for PTM
	Call weekly or bi- weekly meeting between Location A and Location B
	Communicate instructions for working hours reporting
	Coordinate travelling in EDG Services
	Coordinate vacation requests in PTM
	Create and up-date processes descriptions
	Create differend kind of customers specific letters
	Create monthly report for EDG Services management team
	Develop and maintain key competence of the team
	Ensure working hours reporting in SAP
	Participate to customer and authority audits
	Participate to EDG Services Quality Forum
	Report quality defects (10 CRF Part 21)
	Up-load documents to PTM server and distribute them

As seen from Table 17, the *responsibilities* in the General *processes* support many of the *processes* presented previously. They relate, for example, to travelling, meetings inside the newly established PTM organization and communication. They involve the employees reporting to the researcher.

Next section discusses about the existing employees in the newly established PTM organization related to these *responsibilities*.

3.8 Identifying Key Existing Roles and Employees

The identification of the existing employees took place during the organizational change but the results were confirmed in the course of the interviews.

Table 18 shows the list of the employees reporting to the researcher.

Table 18. Roles in PTM.

Number	Role
1	Assistant
2	Chief Design Engineer, External
3	Design Engineer
4	Design Engineer
5	Design Engineer, External
6	Engine Expert
7	Engine Expert
8	Engine Expert
9	Engine Expert
10	Product Engineer, External
11	Product Engineer, Technology, Marine Solutions
12	Product Manager ENGINE 2/ENGINE 4
13	Product Manager ENGINE 1
14	Senior Material Expert
15	Technical Manager
16	Senior Technical Superintendent
17	Senior Technical Superintendent

As seen from Table 18, the *roles* in the newly established PTM organization given are working for all the *processes* presented above. Totally 14 persons are working with permanent contracts and three with temporary contracts. These three employees were included to the study because they will work for more than six months for the newly established PTM organization.

After all four areas of the organization design that were pointed out in the expectations part of the current state analyses were discussed above, the next section discusses about the key findings related to the elements for building the newly established PTM organization.

3.9 Key Findings from the Current State Analysis

Summing up, this section present key findings which need to be taken into account when developing the new organization design. The current state analysis consist of interviews including totally 46 employees, 10 meetings and other internal documents as presented in Section 2.3. The current state analysis focused on the status of the key elements which could be taken into account when developing the newly established PTM organization.

Earlier, Section 3.3 identified the expectations of the designers of the EDG Services who are expecting the following things: first, the *processes* should be used for guidance only

and the newly established PTM organization shall use common tools what 4-stroke Engine Services also use. Second, the *sub-functions* and management should change mind-set from products to customers. Third, *roles* and *responsibilities* should be more global and EDG Services is expected to take leading role with all EDG activities. Fourth, *hierarchical structure* should authorize the researcher to create visibility to activities taking place in France. Current *hierarchical structure* contains three hierarchical levels for some of the *functions* but another have only two levels.

The findings from the current state analysis can be summarized into four categories:

First, the *processes* are existing for the common way of working. The *processes* were identified for sake of clarity in Section 3.2 under four different categories: 1. Technical services, 2. Technical information, 3. Product management and 4. General. On the other hand the findings show lack of descriptions for demanding EDG specific process. The owner of the process has not been decided and creation of process would need commitment from other *functions* and divisions. Hence, this lacking process is out of the scope of this study. Findings point out that, (a) Technical Request tool works well inside the case company, but it does not work in practice for Location B factory, (b) installed base of ENGINE 1 is very large therefore there is a good sales potential if all customers are reached.

Second, the *sub-functions* are generally clear and good. However, there are different types of employees who do not have clear own function. Findings point out that, (a) specifically dedicated people for different topics such as for customer or manufacturing has been creating good results, (b) collaboration inside the newly established PTM organization (one location) who are working for ENGINE 1 is good. The 4-stroke Engine Services has proposed the new *roles* for the newly established PTM organization which indicate that the newly established PTM organization is supposed to be self-sufficient. Additionally, out of scope of the study, the current state analysis investigated also interfaces outside the newly established PTM organization and it shows that management of work across *functions* is unclear. The interviewed people lead the newly established PTM organization to be connected to totally 38 *functions* in Section 3.6.

Third, the *roles* and *responsibilities* are clear inside the newly established PTM organization. On the other hand, employees of the newly established PTM organization have asked if changes would be possible. Totally 115 *responsibilities* were identified in Section

3.7 to be organized. According to Section 3.8 the newly established PTM organization includes 11 different *roles* which totally makes 17 employees. Findings point out that, (a) many interviewees appreciate experience of Engine Expert for ENGINE 1, (b) that Senior Material Expert in Location B produces high quality of investigation reports, (c) Assistant for ENGINE 1 has good way of working with documents, (d) in the past, well planned knowhow transfer has been good way to grow new people to new positions. In this case an experienced employee was working for one year parallel with a new employee for data transfer.

Fourth, the *hierarchical structure* can be put in question and could be changed in the new organization design. Figure 7 shows the *hierarchical structure* in the end of current state analysis (23.3.2017).

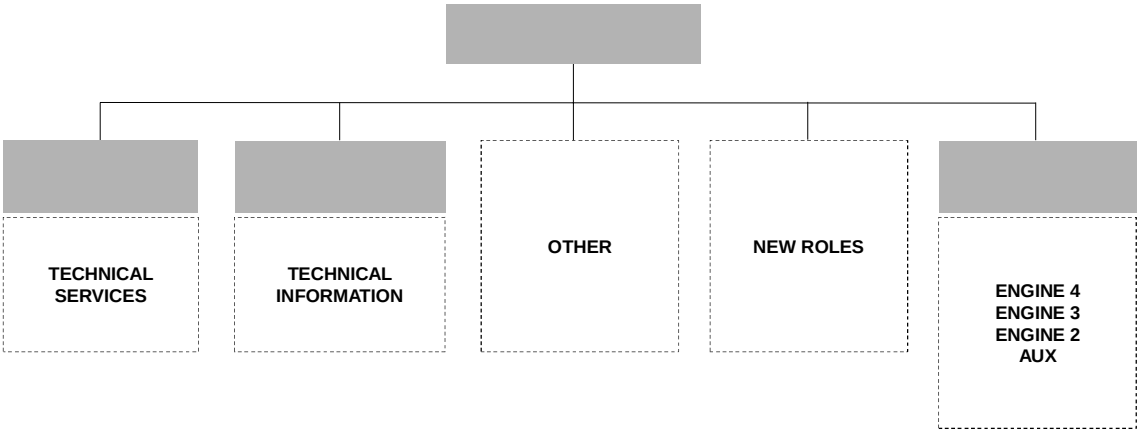


Figure 7. Hierarchical structure of PTM in the end of the current state analysis.

Figure 7 shows the *hierarchical structure* (grey) of the current existing organization. These findings will quite to build of the newly established PTM organization. The outcome of the current state analysis was shared with all interviewees and meeting participants 29.3.2017 (Internal documentation: Product and Technical Management for EDG Services.pptx).

The next section focus on explaining overview knowledge and best practice to build the new organization design for the newly established PTM organization.

4 Existing Knowledge and Best Practice on Organization Design

This section discusses about the tools and concepts for the organization design and organizational change process. The section reviews suggestions from different scholars to define *processes*, *functions*, *roles*, *responsibilities* and build *hierarchical structure*. The section also focuses on identification of design principles and criteria. The term organization design is introduced in order to identify terms and scope of this phenomenon. Organizational change process is also discussed because it introduces the managerial tools to define *processes*, *functions*, *roles*, *responsibilities* and *hierarchical structure*.

4.1 Concepts of Organization Designing

Organization is a group of people working together in a structured and coordinated way to achieve goals set by strategy (Griffin 1999). *Organization design* is the term which relates to *structures*, *processes*, *rewards*, *people* and policies which are needed to achieve business strategy (Galbraith et al. 2002). *Organizational change* is a term which relates to any effective modification to building block of the *organization design*. The change can be initiated externally such as environment or the change can be initiated internally by revising strategy or change of people. *Planned changes* takes place orderly, but also *reactive changes* are very common which they tend to take place in a hurry causing poor execution (Griffin 1999). This study focus on planned changes.

Organization design can be considered as a verb as well as noun (Cichocki and Irwin 2014: 17). It is building a connection between several different parts that companies need in order to create competitive advantage in the markets. Jay Galbraith developed a *Star Model* framework which presents the *organization design* in five different components: *structure, processes, rewards, people* and *strategy* (Galbraith et al. 2002). Figure 8 shows Jay Galbraith's *Star Model* framework.

Figure 8. Star Model (Galbraith et al. 2002: 2).

As seen from Figure 8, it shows five different components of the organization design in the *Star Model* framework, since the scope of this study is limited to *Structure* and *Processes and lateral capability* in Galbraith's terms, other parts are not discussed. Corkindale (2011) highlights that it is the *strategy* which changes. The change requires organization to be re-designed but leaders often do not know what to do for the design. Gorkindale (2011) lists the five common findings: first, sometimes the *roles* become monsters, if leaders add different *responsibilities* to the old ones. Second, politics decreases co-operation between departments. Third, over-regulation makes completion of job impossible because nobody has the right to decide. Fourth, applying for an own job is used as a re-organizing method. Fifth, a group of *people* defines themselves to be the same group which was established 20 years ago; resistance of change prevents the organization to follow the new strategy.

Aghina et al. (2014) summarize three key points for the organization designers: first, the *organization design* of tomorrow will be different from the past; second, rigid global *roles* and *processes* should be minimized and third, the location to bring *people* physically together still matters. The *strategy* sets the direction for the organization, it gives the goal for the organization: by which way the organization wants to differentiate itself in the markets. The *structure* defines the location of power and authority but also the relationships and hierarchy. The *structure* includes the *organization chart* which is seen as a

"backbone" in the body. The *structure* sets the group *people* to different levels. The *organization design* process defines the *roles* and *responsibilities* in all levels and explains how they are joined together. The *roles* are like "organs and muscles" in the body. (Galbraith et al. 2002)

Similarly, Cichocki and Irwin (2014) suggest an *Organization Design Compass* framework which consists of four different components: *norms & behaviors, enablers, structure* and *work*. The *Organization Design Compass* is shown in Figure 9 below:

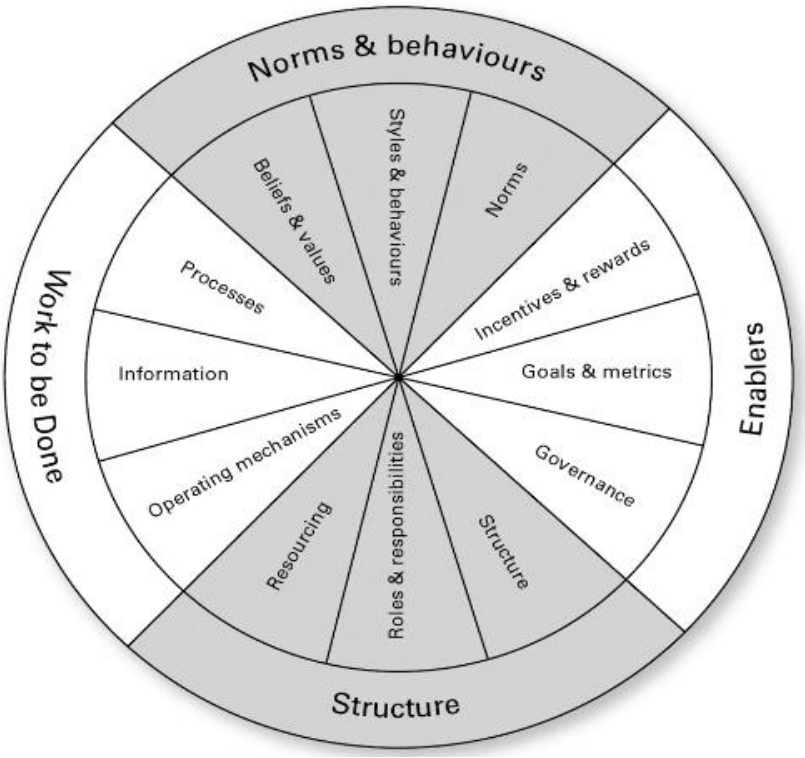


Figure 9. Organization Design Compass (Cichocki and Irwin 2014: 32).

As seen from Figure 9, it shows that *Organization Design Compass* (Cichocki and Irwin 2014) use four different components for the *organization design* framework, instead of Galbraith's five. The word *structure* is found in both of the frameworks.

According to Galbraith et al. (2002) *Processes* and lateral capability are needed in order to avoid silos and overlapping between the organizations; they are *coordinating mechanisms*. Lateral capabilities are built in order to manage information over organizations. Organization needs interpersonal networking, technological networking and matrix relationships to act as "blood and nerves" in the body to bring *people* together. (Galbraith et al. 2002)

Next, *Reward* systems are established for individuals in order to target the work towards the organization's goals. These systems enable measuring of human performance and motivate *people* to give their best. (Galbraith et al. 2002)

Finally, *People* practices are originate from the *strategy* which state what types of mind-set, skills and competencies are required from the *people*. These practices include *people* management, learning and development of "living organism". Figure 10 shows the *Star Model* framework with compilations and challenges. (Galbraith et al. 2002)

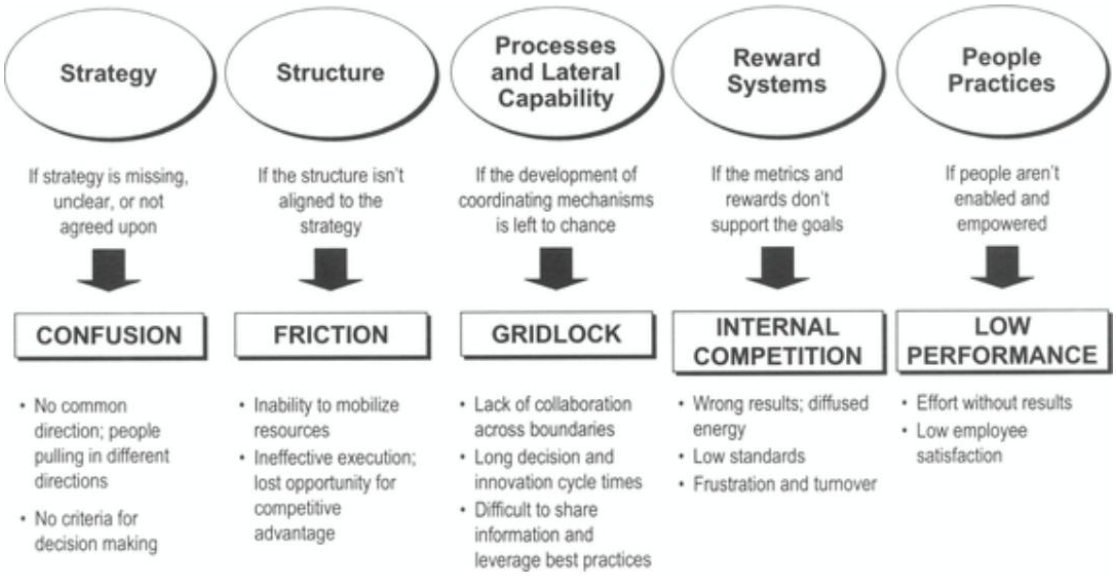


Figure 10. Unaligned organization design (Galbraith et al. 2002: 5).

As seen from Figure 10, it shows consequences if any of the components of the *organization design* that are missing or not supporting each other. In these cases, the organization loses its performance. For example a lack of collaboration across different organizations, can be caused by the lack of the *coordinating mechanisms*. The *coordinating mechanisms* are discussed further on in Section 4.7. Figure 11 shows the heart of the *organization design* according to Aghina et al. (2014).

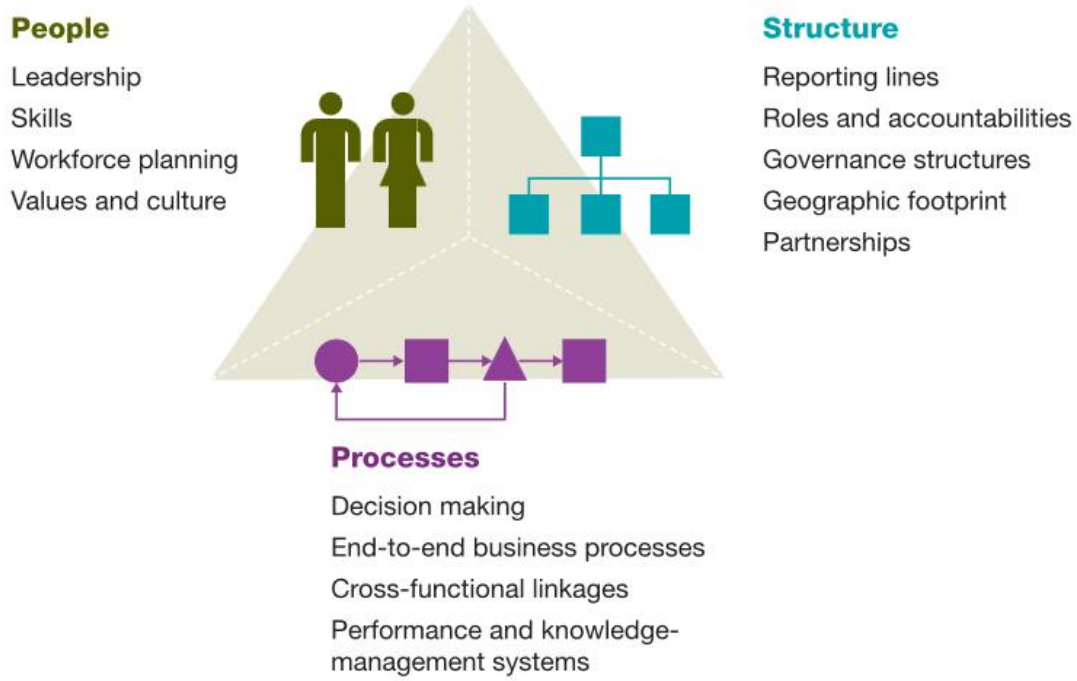


Figure 11. Structures, processes and people (Aghina et al. 2014: 7).

As seen from Figure 11, it shows the heart of the *organization design* which points to the key elements in the *organization design* during the last decades.

Nowadays, many companies consider change from matrix organizations to other design configurations. One of reasons is that matrix does not offer protection for employees (Keleher and Taylor 2006). 1970s the matrix organization was seen as solution for all larger organizations, while nowadays many scholars suggest to go for more *process*-centric thinking without forgetting that process-based *structures* should enable the specific customer fit solutions. (Aghina et al. 2014) Agility, in the context of the *organization design*, is seen as organization's ability to re-born, adapt and change quickly in the turbulent environment.

According to Aghina et al. (2015), agility grounds on two things: *stability* and *dynamic capabilities*. According to Smet et al. (2016), the big data and digitalization is seen as a new reason to revise *strategies* and re-design organizations, scholars remind that researchers should build *stability* for employees to get them to build on change in the future. The *stability* is needed as a basis to create agile organizations. While small start-ups have *stability* around the founder, big companies need to create it from other elements. Another requirement is that company has to have *dynamic capabilities*, such as responsiveness. These two groundings have to be found from all three building blocks

of the organization design: *structures, processes* and *people*. Finally, scholars write that the most agile companies have one thing in common, namely, they do not “play the box game” so often, instead they use *structure as* a home for their talent. (Aghina et al. 2015).

Summing up, the basis of an agile organization are the *hierarchical structure*, *processes* and *people*. This study does not include all the areas but focuses only on the *hierarchical structure* and the *processes and lateral capability,* in Galbraith’s terms.

4.2 Organization Design Process

The *organizational change process* includes all the building blocks of the *organization design*. In this study it means the *processes*, *functions*, *roles*, *responsibilities* and *hierarchical structure*. According to Galbraith et al. (2002), the *organizational change process* consists of the four different phases: first, the change is started by determining the design framework; second, designing the organization; third, developing the details; four, implementing the new design. Figure 12 shows the four steps to complete *organizational design process*.

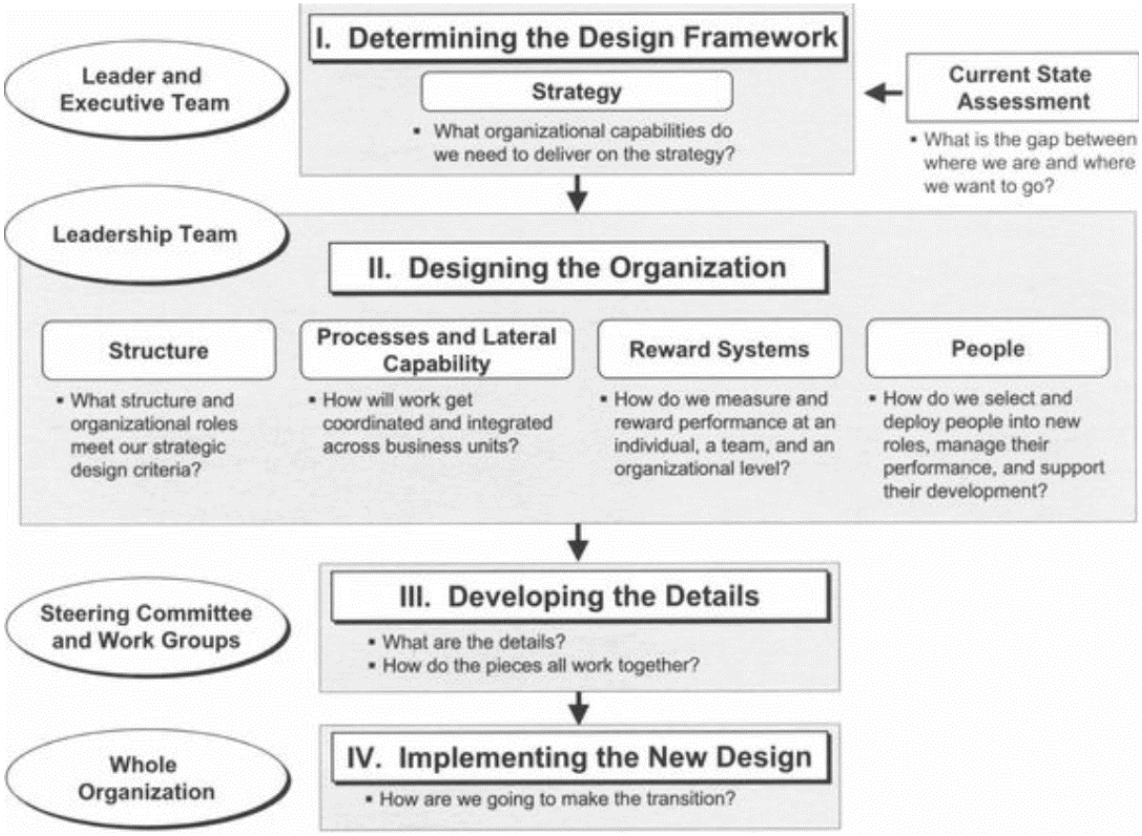


Figure 12. Organization design phases (Galbraith et al. 2002: 18).

As seen from Figure 12, first, the *strategy* or *expectations* from leader and executive team set the direction for the change. Second, leadership team including the researcher create *design options*. Third, the participation of employees increases when they are developing details for the new organization design. Fourth, the whole organization is charge to implement the new design.

Similarly, Figure 13 shows the way Cichocki and Irwin (2014) define the same process into the seven different phases creating the abbreviation: OPTIMAL.

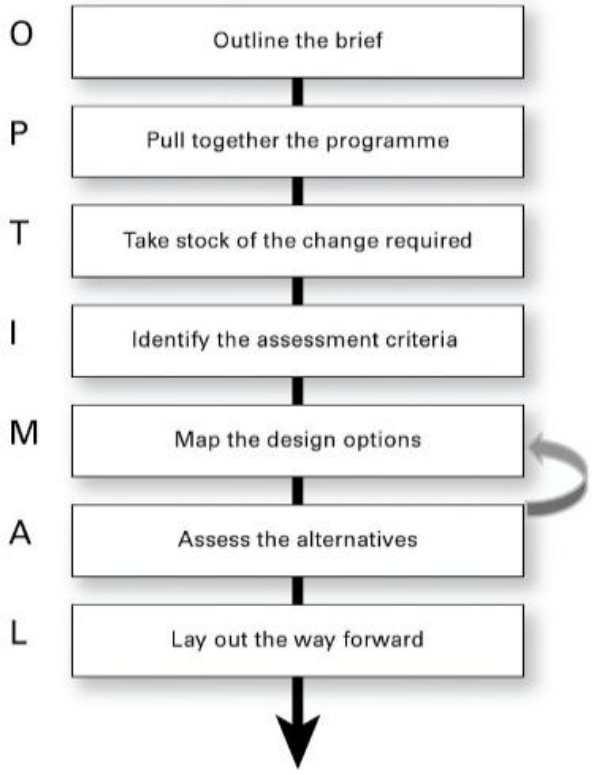


Figure 13. Organization design phases (Cichocki and Irwin, 2014: 39).

As seen from Figure 13, it shows the seven phases (OPTIMAL) to guide the *organizational change process,* starting from understanding of as-is situation ending to the implementation of change. Barber et al. (2003) launch the phases from four phases: first, understanding of business model and the strategy. They have to be understood from the organization design point of view. Second, analysing *status quo*, for example the *processes* and communication. Third, defining the rewards and the *hierarchical structure*s. Fourth, making sure that the whole organization is committed from the top to down. Following this logic from Galbraith et al. (2002), the next paragraphs present *organizational change* in the four phases:

First, the phase generates *the direction* for the change. According to Cichocki and Irwin (2014) this phase include the three letters: OPT. The phase starts from O: Outline the brief; P: Put together the program and T: Take stock of the change required.

Second, the phase generates *design options*. According to Cichocki and Irwin (2014), this phase to include the three letters: IMA. The phase starts from I: Identify the assessment *design criteria*; M: map the *design options* and A: assess the alternatives.

Third, the phase generates *the details*. It is performed with operative people in co-creation workshops in order to improve ideas, make decisions and to consider practical implementation (Galbraith et al. 2002). The co-creation workshop for the organization design has very important meaning to get commitment to the solution. This is the phase where *participative approach* shows high importance. Before calling meeting together, participants from different levels of the *hierarchical structure* shall be considered (Galbraith et al. 2002: 106). The agenda of the co-creation workshop should be established by keeping in mind the five requirements: first, the researcher ensures that the meeting brings some education for participants. Second, the decisions are made and people are networking. Third, the flow of the work is chronological. Fourth, the questions to be solved are clearly stated in order to avoid side tracks. Fifth, the researcher has to make sure that people have time, space and visual tools to formulate their opinions.

Fourth, the last phase in the *organizational change process* generates implementation. The implementation of the new design involves the whole organization. The *organizational change process* starts with the strategy review but reality is that the process is iterative and organizations end up to revise their strategies as well based on findings during the organizing process. Despite of changes, the implementation has very fruitful ground if the organization has already bought the mind-set of “we deliver the strategy”. According to Cichocki and Irwin (2014), this phase to include the letter L: Lay out the way forward. (Galbraith et al. 2002)

Finally, implementation team for the implementation of the design change, is defined in order to make sure that the decisions taken in the co-creation workshop materialize to the practical work. The sponsor has the highest authority to agree or disagree with the proposal given by the co-creation workshop. The sponsor is typically responsible for the strategy. (Galbraith et al. 2002)

Summing up, the *organizational change process* consists of the four steps. The number of participants increases when progressing in the process. The steps one, two and three are in the scope of this study. The next section discusses about the first step.

4.3 Organizational Capabilities, Design Principles and Design Criteria

Organizational capabilities are skills, *processes*, technologies, and human abilities that create competitive advantage. The *organizational capabilities* has to be understood as one of the existing building blocks for the *organization design*. This section discusses about transfers of the *strategy* into *design criteria*.

The strategic statements act as a basis to define the following two terms: the *design criteria* and the *design principles* (Galbraith et al. 2002). The difference between the *design principles* and the *design criteria* are small but the *design criteria* can be seen as more accurate requirements (Galbraith et al. 2002: 272). Table 19 shows typical *design principles* for different types of organizations.

Table 19. Design principles for organizations (Cichocki and Irwin 2014: 156).

	Organization type	**Example of design principles**
1	Product leadership	• Organization must deliver the best products to customers • Organization must constantly encourage product innovation • Product marketing is a key to us
2	Decision-driven	• Organization must improve its decision making – Prioritized on value. • Organization must have clear *roles* and accountabilities • Organization must involve the right people at the right level in the right part of organization at right time. • Where there is a conflict of hierarchy, decision roles outrank structural *roles*

As seen from Table 19, when designing the decision-driven organization (row 2): first, values should guide decision making; second, decision related *responsibilities* needs to be clarified; third, sometimes the *hierarchical structures* have to be flexible in order to reach the decision.

Table 20 shows the *design criteria* for *design principles*.

Table 20. Design principles and design criteria (Cichocki and Irwin 2014: 153).

	Design principles	**Design criteria**
1	Simplifies current structure	• Clear single points of accountability: no use of 'joint' in *role* descriptions • Reduced use of matrix organization *structures*
2	Broadens spans of control	• There will be no long-term 1:1 or 1:2 reporting lines • A minimum ratio of 1:6 to 1:8 will be target for management *roles*
3	Simplifies business process	• Minimizes boundaries between our organization and our clients • Minimizes internal hand-offs • Embeds specific *process* ownership

As seen from Table 20, the *design criteria* such as ratio between managers and subordinates (row 2) can be setup in the beginning of the *organizational change process*. It is recommended to aim an approximately 12 *design principles* and from one to five *design criteria* per each *design principle*. The *design criteria* should be allocated for the building blocks of the *organization design* (see Figure 8 and Figure 9) such as *processes*.

This section introduced the first step of *organizational change process* in order to clarify target of *organizational change* and the existing building blocks of the new organization. The next sections discusses about the four building blocks of *organization design*.

4.4 Defining Key Processes

Previous sections introduced the *organizational change process* including several different steps in chronological order. *Organizational capabilities, design principles* and *design criteria* define *status quo* and give the direction for the change, like the *strategy* does. The following Sections 4.4, 4.5, 4.6 and 4.7 describe the best practices to put the building blocks of the case company in order. The four building blocks are divided into smaller areas called sub-blocks.

The aim of this section is to introduce the processes in three sub-blocks: first, different *processes* in terms of the organization design are discussed. Second, the section shows

different approaches for data gathering and visualization for *process* maps. Third, the section introduces different approaches to create and update *process map* step-by-step.

The term *process* in the context of the organization design needs to be defined in order to clarify the scope of the study. The *processes* are needed in order to avoid organizational silos and overlapping between the organizations. The organizational silos are a typical challenge for the functional departments. The case organization has functional departmentalization, and therefore the study focuses on the *processes*. Burton et al. (1995) highlight the importance of the workflow analysis, flow of information and decision making practices as a key for the organization design. (Galbraith et al. 2002)

The next paragraphs describe the *different types of the processes*. According to Cummings and Worley (2009) the re-engineering of organization should be started from the *processes*. This approach helps the researcher to break down vertical orientation which goes through functional departments. This approach helps the researcher to identify the independencies and dependencies between different functional departments. The new *processes* are typically built to improve multifunctional work and employee empowerment. Analysing the *processes* is the best way to get familiar with the tasks. Cichocki and Irwin (2014) suggest starting from the business related *processes* and therefore excluding the support *processes*.

Garvin (1998) defines organization design related *processes* to three different categories: *work processes, behavioural processes* and *change processes*. Only the *work processes* are in the scope of this study. The *work processes* describe the business *processes* through the different *functions*. Typical *work processes* for a product focused organization are product development and innovation management. On the other hand, the *work processes* for customer focused organization are knowledge management and solution development. (Galbraith et al. 2002). The *work processes* are called the *processes* later on in this study.

The next paragraphs describe the *different levels of the process maps*. The *process map* intends to show the relationships between the *responsibilities*, data, people and tools in order to produce the desirable output. While the *process map* tends to present the so called hard part of the process, the challenge is the so called soft part; *sociotechnical* aspects. The *sociotechnical* aspects reflect to both cultural and political variances around

the *processes*. The challenge in analyzing and changing the *processes* is that understanding the *sociotechnical* aspects is very demanding. (Biazzo 2002). Similarly, Majchrzak and Wang (1996) suggest that process re-design does not bring benefits if the collective sense of responsibility is not found. Different scholars define that process analysis and descriptions can be made from two to five different *process map* levels. The mapping of the *processes* can be divided into different levels in terms of details.

Cichocki and Irwin (2014: 180) suggest to divide the process descriptions into two different levels. The level one remains very overall. According to Cichocki and Irwin (2014) the level two visualizes the *processes* with different types of boxes separating the responsibilities: taking actions and making decisions. Similarly, Kates and Galbraith (2007) suggest to use the two level process mapping. This method starts with high level *responsibility* mapping in which the *responsibilities* are listed in chronological order in horizontal direction and different *roles* under each *responsibility*. Kates and Galbraith (2007: 122) argue that the level one mapping is suitable for example for frequently changing matrix organization. The more experienced researchers go to the second level to visualize the initiation of *process*, *responsibilities*, documents, decision making and review points.
According to Morrison (1995: 158), there are four levels that organization may need. The level one should only count from three to eight *responsibilities* per process. The researcher should not go too deep into the details in order to avoid extreme complexity. However, there are two things to be tackled: first, the employees are scared that too overall process mapping leads to unclear *roles*. This is something that can easily be solved by interviewing the doers of operative work in the organization design process. Another concern is that the researchers imagine that tasks are easy and employees produce poor quality. Morrison (1995: 156) concludes that this is mainly an imagined situation. The level one improves the understanding of the tasks. On the other hand, in order to reach huge process improvements, level two and three are needed (Morrison: 171). Figure 14 shows the different levels of the *process maps*.

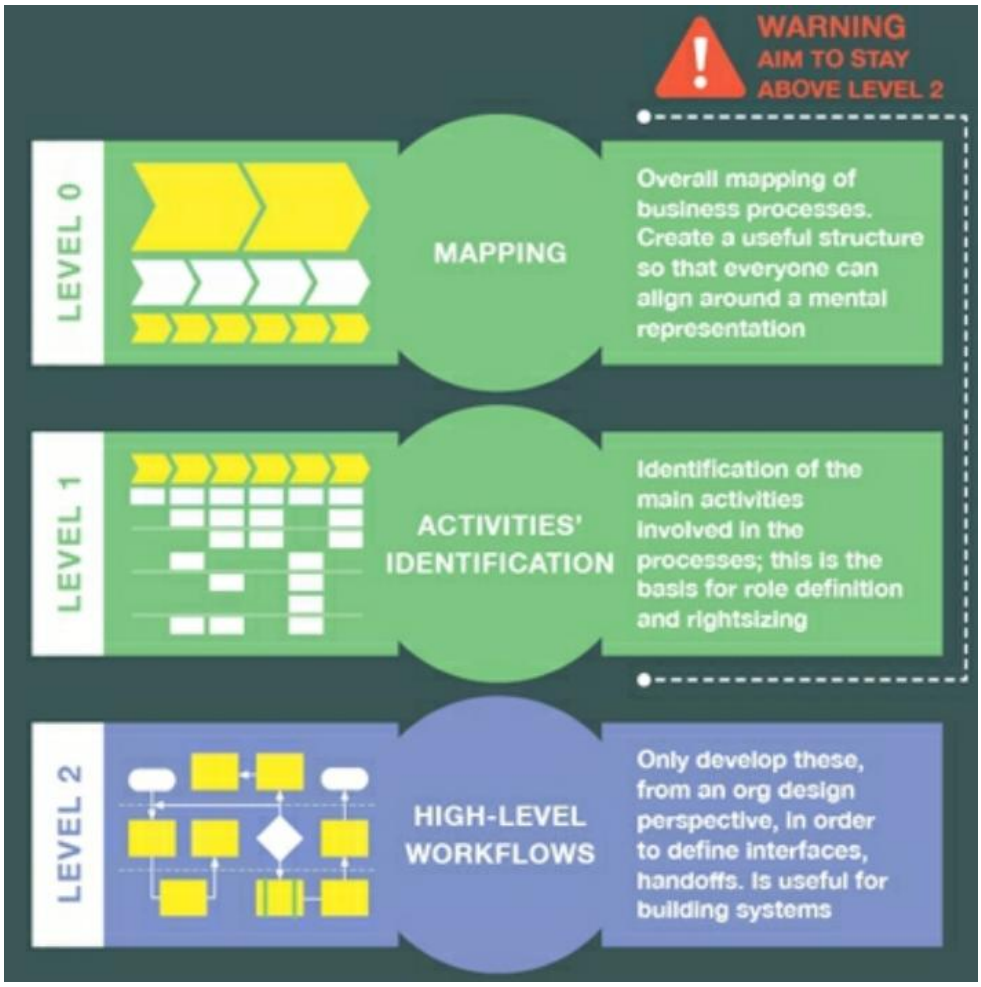


Figure 14. Levels of process maps (Morrison 1995: 155).

As seen from Figure 14, there are different levels of *process maps*. The level zero is high level business *process map* which is not suitable for the case study. The level one sets the *responsibilities* to a chronological order and introduces the *roles*. According to Morrison (1995), if even deeper analysis is needed, mapping levels two and three can be created. The levels two and three show different organization and *roles* on vertical direction. The size and the shape of the boxes visualize the different types of *responsibilities*. After this, the level four includes written the *process* descriptions. The scope of this study does not include the improvement of the *processes*, therefore the level one can be selected.

The next paragraphs describe the *steps to define the process map*. According to Cichocki and Irwin (2014), the high level process mapping should consist of four different steps: first, identifying the inputs; raw material or information. Second, identifying the

operational controls; regulation of the process. Third, identifying the operating mechanisms; physical tools and facilities. Fourth, identifying the outputs; the planned products and services including waste.

According to Galbraith et al. (2002) the definition of the process is divided into seven steps: first, setting up the objectives. Second, clarifying the start of the process. Third, clarifying the end of the process. Fourth, creating the interfaces for other *functions*. Fifth, setting the performance indicators. Sixth, going through *responsibilities* and possible *sup-processes* more in detail. Seventh, creating possible new tools for the process. (Galbraith et al. 2002: 153).

According to Cummings and Worley (2009: 343) if the process needs to be defined, the following nine general instructions are proposed: first, clarifying the customer input and the output. Second, simplifying the existing *processes* by eliminating steps. Third, utilizing the best existing parts in the process. Fourth, including both the hard part of the business and the social aspects of the *process*. Fifth, avoiding limitations from the old practices. Sixth, identifying the critical information for each steps. Seventh, arranging the *responsibilities* into chronological order as they are in reality. Eight, expecting the first time right performance. Ninth, catching the real doers of the work and listening to them.

After creating of the *process map*, Morrison (1995) suggests to analyse the process in a systematic way. Table 21 shows one evaluation method for the *process map*.

Table 21. Process design test and checks (Morrison 1995: 173).

CUWIE	Process design tests and checks
Complete – Gap test	Is everyone's work covered? Do you need to define the work of contractors and suppliers? Will it deliver strategy? Are the priorities from the design criteria met?
Understandable – Visual test	Start each activity with a verb Use colour, size, and icons to reflect dmensions and measures Design so can be printed out efficiently on cards and A3+ papers Use short sentences
Workable – Practicality test	Test through simulation and role-play Count the number of handoffs What are the issues going to be? What is going to stop this from working?
Implementable – Change test	How big is the change for each person and how do that roll-up? What investment is required? What are the improvements and case for change? What is the cost and barriers to change?
Economical – Efficiency test	What will it cost? What steps should be automated, outsourced or stopped? Are the right job-levels doing the right work? Where will the bottlenecks be?

As seen from Table 21, it shows five steps evaluation method: first, the fulfilment of the *design criteria* are analysed. Second, visualization is evaluated. Third, interfaces are considered. Fourth, conflicts between the *roles* and positions are compared. Fifth, possible hierarchical conflicts are analysed.

Summing up, this section discussed about the identification of the work *processes*, levels of *process maps*, different ways to define the *processes* and additionally, analyzing the *processes*. The next section discusses about the *functions*.

4.5 Defining Key Functions

The aim of this section is to introduce three sub-blocks: first, consequences of grouping the people are discussed. Second, possible *criteria* for creating *sub-functions* is discussed. Third, to describe the characteristics of *functional departments*, their strengths and weaknesses are presented.

According to Galbraith et al. (2002), often the first step of the *organization design* is deciding about high level *departmentalization*. Organizations can be built around regional

areas, products, *functions* or markets. *Departmentalization* is defined as follows: (Griffin 1999: 331; Martin and Fellenz 2010: 345): ”The grouping together of activities in organizational sub-units”. This study focuses on *functional departmentalization*. While typical *functions* are sales, engineering and operations, Musters et al. (2013) remind that also government-affairs may require a specific function to be established. Mintzberg (1983) highlights the importance of the coordination of the work. The coordination of the work is the first influencer for a decision to group people together. (Martin and Fellenz 2010)

The next paragraph describes the *consequences of the grouping*. Grouping can be performed by taking into account the four different consequences: first, grouping defines the common supervision for the employees in the *function*. Hence, *direct supervision* is the first influencer for the decision. Second, grouping defines *sharing of resources*, a budget, facilities and equipment. Third, grouping typically creates common *key performance indicators* (KPI) for the employees. This encourages the employees to work towards the same goal. Fourth, grouping encourages for *mutual adjustment*. This forces the employees to work together inside the *function*. These four different *consequences of the grouping* can be used to create the *design options* for *departmentalization* in this study. All in all, grouping has remarkable meaning for *coordinating mechanisms*.

The next paragraph describes *criteria for grouping*. According to Mintzberg (1983), criteria for grouping can be taken from four different *independencies*:

First, *work flow independencies* groups sequential *responsibilities* to one *function*. If the *process* includes 10 *responsibilities* in chronological order in horizontal direction, the process is divided for example into three functions: A, B and C. The *function* A is established to work for the sequential *responsibilities* from 1 to 3, the *function* B from 4 to 7 and the *function* C from 8 to 10. Second, *process independencies* can be visualized the same way as in the previous example. The previous *departmentalization* was built in horizontal direction. Instead, the grouping of employees takes place in vertical direction, based on similarity of the work in the different *processes*. Third, *scale independencies* takes the work load in the different functions into account. If the *responsibilities* planned for one employee in the *function* A do not cover the work load of full-time equivalent (FTE), it is natural to move the employee into the *function* B which is suffering from the lack of resources. Fourth, *social independencies* takes human aspects into account. History shows examples when dangerous working environment such as mining has grouped employees together. Despite the rapidly developing technologies, the situation has not

changed. Humans look for similarity from each other; something which makes them to get along with the others. Scholars define the art of social grouping as *sociotechnical science*.

The next paragraphs describe the *creation of design options*. The four different *independencies* can be used as a base to create the *design options* for *functional* departmentalization. Table 22 shows the tool for weighting the *design options*.

Table 22. Simple weighted average option appraisal examples (Morrison 1995: 91).

A	Rating of design options	Weighting	Design option 1	Design option 2
B	**Improve functional excellence**	89	9	3
C	**Improve communication and collaboration**	55	6	9
D	**Reduce functional and product silos**	34	9	1
E	**Minimize number of managerial roles**	21	6	3
F	**Minimize cost**	13	1	9
G	**Total**	212	7,4	4,6

As seen from Table 22, the design criteria are on the left (rows from B to F). The design criteria originate from the strategy. The two *design options* are shows on the top of the table (row A) and the outcome of the tool is on the bottom of the table (7,4, row G). The outcome is calculated by using the following formula for the design option 1: (89*9+55*6+34*9+21*9+13*1) divided by (89+55+34+21+13). Morrison (1995) highlights that the weighting makes a huge meaning even if the *design options* are rated on scale 1, 3, 6 and 9. Morrison (1995) argues that this type of simplified method has the following limitations: first, the weighting has too high importance (multiplier from 13 to 89, from row B to F). The decisions can only be taken if there is one clear winner. The example shows a clear difference between the two design options (7,4 and 4,7, row G). Second, the weighting tool requires the user to process numerical rating between the two design options. Finally, it is a good tool for brainstorming the importance of the *design criteria* but Morrison (1995) suggests to break down the challenge into smaller pieces. Instead of Morrison's data-driven approach, Cichocki and Irwin (2014: 196) suggest to rate the *design options* in scale from 1 to 4 and not necessarily use weighting at all.

The next paragraph describes *the evaluation of the strengths and weaknesses of functional department*. Table 23 shows the summary of the arguments that can be considered when dividing the function into *sub-functions* or combining *sub-functions* into one.

Table 23. Summary of arguments related to strengths and weaknesses of splitting or combining an organization into sub-functions.

	Galbraith et al. (2002)	Burton et al. (1995)	Hatch and Cunliffe (2006)	Mintzberg (1979)	Griffin (1999)	Martin and Fellenz (2010)	Irwin and Cichocki (2014)	Cummings and Worley (2009)
Note	Single line of business. Are small. Need common standards. Depth of expertise in one or more functional areas. Similar type of products. When marketplace does not need speed of product development.	Units benefit from specialization. Minimize the sum of coordination costs. Merging of functions for synergies. Higher performance in one than a separation of the two. Units have clear reporting lines. The span of control aligned with conditions and leadership capabilities. Sub-units are defined based on manager's time and capacity of sub-units to process information.	Established when there is increased demand for differentiation, high level task independency and common goals. Used many times for government organization.	When there are high expectations for knowledge, skills and work processes. Formalization is used to achieve coordination. Bureaucratic when work is unskilled Requires more liaison persons for cross-functional coordination.	For small units. Decisions to share units to functions can be based on strategical issues or location of resources.	Functional structure can be shared to two specific areas: Line organization which deliver main purpose of the organization. Staff function which delivers support activities.	Economic scale and functional expertise. Young and small organizations. Stable market conditions. Understandable customer requirements. Narrow product lines. Long product development and life cycle. Need of specialists.	For stable and certain environment. For small to medium size. Routine technology, interdependence within functions. For high efficiency and technical quality.
+	Knowledge sharing Specialization Leverage with vendors Economies of scale Standardization	Easy to assign individuals and sub-units to specific tasks. Employees skills and efficiently. For tasks repeated frequently and in high volume. High efficiency when no rapid changes are required.	Economies of scale Limits duplication. Easy to identify own responsibilities. Manager has a good control for activities.	For own processes For independency for work and for social aspects	Managers understand what their sub-ordinated do. Manager has realistic expertize needs: leaves space also leading people. Coordination of activities is easy.	Collection of similar activities together supports efficiency. Self driven skill development sustains functionality. For limited amount of services or products	Used as a part of larger divisional organizations. For strong control and command. For single product companies. When responsibilities and specialization needs to be defined accurately.	Skill specialization. Limits duplication of employees. Employees focus on the work full time. Career development for specialists. Managers share expertise with team. Show true specialists.
-	Managing of different type of product or services is difficult. Cross-functional processes may struggle.	Requires capable manager for short-term tasks and long-term specialization. Poor horizontal communication. Large middle management for information processing for vertical communication. Every function requires vertical coordination across all the functions. Number of levels in function needs to be aligned with number in other functions.	Too high locality for own function creates silos. Too much load for manager when organization grows. Difficult to replacement manager with wide spread responsibility.	Difficult to measure over performance of unit. Extreme specialization may lead to loosing of big picture of the business. Risk to lack mutual coordination. Decisions and problems are escalated up.	Decision making slow and bureaucratic. Employees can lose sight of business view. Accountability for business is difficult to measure. Performance is difficult to measure.	Speed of response to environmental changes. Innovation and change readiness. Managers overloaded with decisions. Insufficient cross-functional communication. Conflicting objectives lead to silo effect.	Risk for managers over burning if organization is large and products have wide scale. Coordination over functions. Limited innovation capability from business point of view.	Operative view only for short time horizons Specialization may limit career path. Cooperation between departments. Interdepartmental dependencies leads to silo effect. Vague accountability for business performance.

As seen from Table 23, dividing the function to different *sub-functions* may improve specialization but on the other hand create organizational silos. In addition, the summary shows that by combining several *sub-functions* to one *sub-function,* the efficiency may be improved but at the same time the manager may get overloaded.

Summing up, the decisions regarding high level departmentalization have been made earlier for the case organization. The case organization is structured as *functional* department, instead of regional areas, products or markets. Therefore, the study focuses on defining the number of *sub-functions* inside the *function*. When defining *sub-functions* for the function, it is important to create reasonable *design options* taking above mentioned consequences (*direct supervision, sharing of resources, KPIs, mutual adjustment*) and *criteria* for grouping (*work flow, process, scale, social*) into account. Finally, a systematic comparison between the *design options* should be performed. The next section discusses about the roles and responsibilities.

4.6 Defining Key Roles and Responsibilities

The aim of this section is to create an overview of *roles* and *responsibilities* in three subblocks: first, the *type of the work* for one employee is discussed. Second, the content and the steps to create and update a *role* or a *position description* is discussed. Third, scope and the usage of *responsibility matrix* to establish the *role* or the *position descriptions* is discussed. Finally, a link from the *responsibility matrix* to the *hierarchical structure* is given.

The next paragraphs describe the way to identify the *basic types of the work*. A *role* is the term used for unit or an employee. An *outcome* is defined for each of the *roles*. The *outcome* can include measurable values. It is recommended that the *outcomes* are described with verbs such as be, have or grow. The way to reach the *outcome* is the set of *responsibilities* which describe the practical work. The *responsibilities* are often described with verbs such as improve, provide, or design. The *role* can be seen as a framework; the *role* is a plan for the *position*. Therefore, when an employee is selected to the planned *role* it becomes the *position*. Hence, this study uses the term *role* and the *position* for different purposes. Accordingly, the *positions* are linked in the specific social network while the *roles* do not have the specific social network. As an example the *role* is *The President of United States* but there have been many *positions*, some of them are very different from each other, especially today (Winship and Mander 1983). *Position*

descriptions are the more challenging to establish than the *role descriptions*. A vague definition causes frustration and inefficiency (Galbraith et al. 2002: 82).

Cichocki and Irwin (2014) suggest to get familiar with the type of the work before designing the *roles* and *responsibilities*. Galbraith et al. (2002) highlight that despite the level of the organizational change, it is important to realize the degree of stability and the complexity of the environment of the organization in question. Another framework for the work is the degree of standardization. The standardization contains the degree of analysability and the variety of the work. Cichocki and Irwin (2014: 71) give a work standardization framework in which the analysability and variety are compared. If the work is more standardized, an information flow is more vertical. If the *hierarchical structure*, rules and a governance are stronger, the operative *roles* can be fulfilled with lighter competencies. Instead, if the work is less standardized, an information flow is more horizontal. High level accountabilities, advanced trainings and more demanding competencies require more of the content of the *role*.

In order to understand the design goals for the different individual *roles*, Griffin (1999) uses the term *job design* to define individual's *responsibilities*. The *job design* includes usage of tools, decision making, identifying goals and establishing indicators for success, in other words KPIs. According to Griffin (1999), the *job design* includes a *job specialization* which defines the size of the tasks. According to Mintzberg (1983), the *job specialization* can be categorized as a *horizontal specialization* and a *vertical specialization*. If the work is highly complex, the work cannot have the high *vertical specialization*. A *behavioural formalization* describes the degree of the standardization for the working *processes*: rules and *processes* of the organization. *Training and indoctrination* describes capabilities required from the employee to fulfil the *role*. The organization specifies the requirements for knowledge and skills which are needed to implement the strategy. While trainings cover the formal part, the indoctrination is about norms the organization is following. The norms can be seen as unwritten code of conduct. (Mintzberg 1983)

Alternatively, Griffin (1999) argues that *job rotation*, *job enlargement*, *job enrichment*, *job characteristics approach* and *work teams* can be used to design well performing *roles*. Griffin (1999) suggests that *job autonomy*; the degree of employees' own control in the work, is an effective way to create interesting *roles*. According to Martin and Fellenz (2010), the *job design* is about grouping, assigning and structuring the tasks for individual

employees. History knows an example from the year 1776 when Mr. Adam Smith (1723-1790), the famous Scottish economist, considered economic aspects of the *job specialization* and division of employees.

However, the *roles* should drive employees towards *entrepreneurial behaviour* which is described as a willingness to innovate, be proactive and have some risk taking capability (Jong et al. 2013). According to scholars, the *job variety* does not have similar importance for the *entrepreneurial behaviour* as the *job autonomy* does. The vertical expansion (*specialization*) enables employees' ability to decide how and when to do the job (Jong et al. 2013).

The next paragraphs describe the content of the *role description* and *the steps to create roles*. The purpose of the description is to get both parties, a manager and a subordinate to understand the demands in a better way in the changing environment. According to Galbraith et al. (2002), the organizational *roles* are defined in three steps: first, the r*ole definition*, meaning the *outcome* and the *responsibilities* for each *role*. The *responsibilities* for the *role* need to be clarified in order to reach the *outcome*. If the *roles* and *responsibilities* are identified, the researcher should stop for a moment and consider the priorities and opportunities that are clear at this point.

Second, an *interface*, meaning a mutual agreement to assign a job, to handle it off, to provide consultancy and collaboration. Often, it is the customer who first sees the possible grey areas and conflicts between the different *roles* as an outsider; the mutual understanding between the *roles* is missing. Instead of waiting for the customer feedback, the more systematic way to define *interdependencies* is to investigate what happens in the *processes*. The mapping of the *processes* gives a good opportunity for other *roles* to contribute; which tasks are expected to be completed by others. Another option to generate a mutual expectation is to create a case study in which the *roles* and *responsibilities* suddenly change and therefore they needs to be re-defined for a certain project or time.

Third, *boundaries*, meaning decision making areas which require more attention. Depending of the success of the work the *roles* can overlap or gaps may exist. The purpose of this activity is to define authorities. Some of the *responsibilities* influence negatively for a specific role and therefore towards an individual employee. In order to solve the conflicts beforehand, the key decisions are listed to the *responsibility matrix*. The vertical

column of the matrix defines the decision to be taken and horizontal column defines the *roles* on the top of the matrix. (Galbraith et al. 2002: 84-89)

McNamara (2006) proposes to collect information from different stakeholders. According to McNamara (2006), a good logic to establish *role descriptions* is to clarify the expectations for the new *role*, instead of looking for the old similar type of descriptions. This from bottom to top approach consists of six different steps which are the following: first, if staffing plan exists, it may give a hint about required competences. In this phase the researcher is interested about the needed knowledge and skills. Second, the researcher should acquire more information by interviewing an employee inside or outside the company. The purpose of the interview is to get suggestions from an outsider. Third, McNamara (2006) suggests the researcher to look for employees in similar kind of *roles* and identify the skills and competencies which drives them forward to get the task done. Fourth, it is recommended to launch a questionnaire for employees performing the *role*. Asking them to describe the procedures and practices that make them to succeed. Fifth, changing the view from the process to the *outcomes*. Customers can also describe the skills and competencies they expect from employees in order to deliver the best products and services. Sixth, get the industry specific list of competencies from professional associations or other similar human resource departments.

Alternatively, Cummings and Worley (2009: 505) pay attention to the continuous management of the *position description.* The *role* holder is responsible for updating the *position description*. The long term planning includes four different steps: first, all employees who can contribute to the *position description* are identified. The employees are called together in a meeting away from a daily working environment. Second, the *role* holder presents her or his own perceptions and the views of the *position*. The other employees give their comments within a constructive way in order to not to destroy a co-creation atmosphere. Third, when a consensus has been reached, the *role* holder writes the new description and communicates it to the meeting participants for the final confirmation. Fourth, the participants check periodically that the *position description* and the performance is on an intended level. The steps are repeated according to the needs.

Similarly, the *position description* is suggested to do with an actual people in a charge. Precaution is recognized by Kates and Galbraith (2007: 121). The *role descriptions* or the *position descriptions* are insufficient to define how people should interact with each other. (Kates and Galbraith 2007: 236)

The next paragraphs describe *the usage of responsibility matrix*. The high involvement of an employee is suggested by website Workshop Experiences (2008). The website establishes the *position descriptions* in two different phases. It uses a model which includes also the scale of economics. First, the exercise begins with an analysis of her or his own *position*. The employee lists the *responsibilities* i.e. creates a *responsibility matrix*. Second, the employee ranks the importance of the each *responsibility*. Third, the employee writes down the current share of the each *responsibility* in percentages. Fourth, the employee writes down her or his own suggestion for the new share of the *responsibility* in percentages. Fifth, the employee evaluates the suitability of her or his own skills and satisfaction to the current *responsibilities*. When all the employees have completed the individual part, the second part is to clarify the *position* by discussing with the others. The individual outcomes should be compared in order to sort out possible skewing, gaps and overlapping. Re-allocation of *responsibilities* can also be made by taking into account the skills and satisfaction.

Allocation of *authority* over the borders of the different organizations is not an easy task but several tools have been developed for doing this. Companies often forget the negative tensions in the decision making and hope for the best. The other companies use *responsibility matrix* tools such as RACI (*responsible, accountable, consulted, informed*) or RAPID (*recommended, agree, perform, input, decide*). The usage of the *responsibility matrix* tools often leads to very long discussions about the used terms. The discussion about differences between the *consulted* and the *informed* are argued by Doglione (2016). She highlights that the *responsibility matrix* tools can be used to communicate the *roles* of different people but dysfunctions in the atmosphere or moral are not fixed with this tool.

In order to avoid confusing the *authorities*, scholars give three approaches towards a more collaborative decision making: first, defining an operating model in which leaders agree which connections add value. Second, defining the right forums and *processes*. Third, defining the tension areas and separate them. Often, the reason for the tension is actually the usage of wrong tools such as *responsibility matrix* for strategical decisions. The most challenging strategical decisions are resource sharing, prioritization, inventory, pricing or hiring people. In this category of decisions, consensus is not working successfully. Everyone cannot have *veto-rights*: one person has to have accountability over the quality of the decision. This means that the accountable has 51% share of power to

decide. In the end, this means that the usage of *responsibility matrix* tools such as RACI is not a choice for complex decisions, it only leads to frustration. (Kesler, G., et al. 2016)

Kates and Galbraith (2007: 236) suggest to use ARCI *responsibility matrix* tool to define the levels of the *responsibilities*. These scholars also clarify the *veto-rights* more in detail. The *veto-rights* are used when the decision affects to employees' *role* or practical work. The difference between the *consulted* and the *informed* is in the timing of involvement. The *consulted* can influence for the decision beforehand but the *informed* can only influence after the decision. Kates and Galbraith (2002) also suggest to avoid vague definitions such as "attend meetings". They prefer to start every *responsibility* with a clear verb and focus on the *outcome*.

Website Value Based Management (2016) gives six steps for defining the *responsibilities* for the different *roles*. The website suggests to implement RASCI *responsibility matrix* by using the six steps as follows: first, identifying all the *responsibilities* and *processes* on the vertical direction. Second, identifying all the *roles* needed to accomplish the product and services via the processes. Third, making the first round by filling in the *responsible, accountable, supportive, consulted* and *informed* to the responsibility matrix. Every *responsibility* should have one R; not zero or two of them. Fourth, the *responsible* can be seen as the owner of the activity or process. Overlapping cases should be resolved by drilling in to the details. Conflict situation requires splitting the current description into two as minimum. Fifth, wise versa if the *responsible* is missing, it must be nominated together with other *roles* and *responsibilities* in the process. While scholars often suggest to remove the overlapping *responsibilities* by using the *responsibility matrix*, Majchrzak and Wang (1996) argue that especially *functional* departments need to design the overlapping *responsibilities* in order to reduce cycle times in process context. Similarly, Kates and Galbraith (2007) evaluate ARCI *responsibility matrix* from two different point of views: horizontal and vertical. The first view focuses on improving to get the task done while the latter view focuses on the next step when *role* is connected to *hierarchical structure*.

Morrison's (1995: 45) data-driven approach suggests changes for the often used ARCI, RAPID, RASIC and RAVCI *responsibility matrix* tools. The tools should be simplified. First, complex problem between the *accountability* and *responsibility* is solved by grouping them together, the work belongs only for one person in real life. Additionally, the *consulted* and *informed* is left out because the *responsible* can decide who to consult.

Instead of the *consulted* and *informed*, *support* replaces the two letters. The tool uses abbreviation: RAS. The *responsible* ensures the *output*, the *approve* has the *veto-rights* and the *support* gives information i.e. allocates time for the *responsible*.

Summing up, the researcher has to understand from bottom to top approach. She or he understands the *type of the work*, knows the purpose of the *role description* and manages the right *responsibilities* in the *responsibility matrix*. There needs to be a balance between specific *position descriptions* for existing people and general *role descriptions*. If more changes are expected in staffing, the *role descriptions* have a higher importance while *position descriptions* can be handled as second priority. The next step is to ensure that the *responsibilities* are on the right level in the vertical direction of the organization chart. The next section discusses about the *hierarchical structure*.

4.7 Defining Hierarchical Structure

The aim of this section is to describe the *hierarchical structure* in three sub-blocks: first, the coordinating mechanisms are discussed. Second, the flatness of the *hierarchical structure* is discussed. Third, the creation of the *hierarchy* is discussed. These sub-blocks lead the researcher from the *processes*, *functions*, *roles* and *responsibilities* to the organization chart.

The term *hierarchical structure* is defined in several different ways by organization scholars. Martin and Fellenz (2010: 592) define the *hierarchical structure* as follows:

> *The formal arrangement of task, communication, and authority relationships that influence and control how people coordinate and conduct their work.*

The size of the organization does not define suitable *hierarchical structure* but bigger organization requires more iteration rounds. The *hierarchical structure* is also called as an *architecture* of the *organization design*. In order to deliver the *strategy*, the processes, access to information and an authority are defined. (Galbraith et al. 2002). The importance of the *hierarchical structure* is often underestimated. The lack of clear *hierarchical structure* creates confusion, lack of coordination, it limits the sharing of ideas and makes decision making slow (Gorkindate 2011).

The next paragraphs describe the creation of the *coordinating mechanisms*. Mintzberg (1983) has the two fundamental requirements which have to be fulfilled in order to get the *hierarchical structure* of the organization in place. Employees need to be assigned to be *responsible* for tasks and the *coordination* over the different tasks need to be arranged. This means that the control and coordination is a part of the *hierarchical structure*. Mintzberg (1983) specifies the five different *coordinating mechanisms*: first, a *mutual adjustment* takes place in a horizontal direction. It is easy in a small organization but becomes very complicated while the organization grows. Second, a *direct supervision* is manager's authority to subordinates. Third, *standardization* is the *coordinating mechanism* when the work *process* can be standardized. Fourth, similarly the *standardization* can be applied to the *outputs*. Fifth, the *standardization* can be arranged indirectly when *skills* and the *knowledge of the employee* are planned carefully. Figure 15 shows Mintzberg's (1983) five *coordinating mechanisms*.

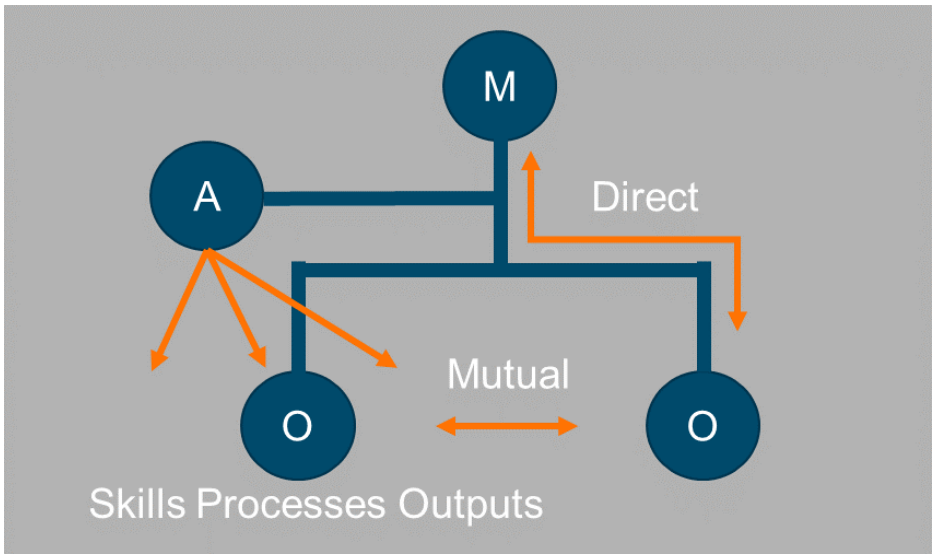


Figure 15. Five different coordinating mechanisms (Mintzberg 1983: 5).

As seen from Figure 15, it shows Mintzberg's (1983) five *coordinating mechanisms*. The *mutual adjustment* means coordination between employees in the same organization. The letter O describes an operative employee. The coordination takes place in the same hierarchical level in the organization. The *direct supervision*: letter M describes the *role* of the manager which depends on the number of employees reporting to the manager i.e. *span of control*. The different types of *standardization*: letter A describes the role of an analyser. The analyser can be used to coordinate the work via *standardization*, however *standardization* is not a feasible solution for the case company because the *roles* and *responsibilities* should support tailor made solutions.

The next paragraphs describe the decisions regarding the flatness of the *hierarchical structure*. Mintzberg (1979) considers that the *direct supervision* has two ultimate challenges to be solved: first, the number of employees reporting to one *manager*, *span of control*. Second, the shape of the *hierarchical structure*, a tall organization has a narrow *span of control* when a flat organization has a wide *span of control* (Martin and Fellenz 2010; Burton et al. 1995). There is no bullet proof answer for the right ratio between subordinates and manager.

When accountabilities are discussed on a higher level, managerial *roles* need to be considered with a special care. The discussion is started from the number of levels (vertical direction), which according to the latest trend should be smaller and smaller. The trend is that hierarchies change to be more flat compared to the previous designs (Cummings and Worley 2009). The flatter *hierarchical structure* gives more power to the actual doers which should also bring decisions closer to the customer. The power and hierarchy of the authority is also called as the degree of a *centralization*. If the organization has a high degree of *centralization,* all decisions are made on the top of the organization and wise versa, a *decentralized* organization involves all levels to the decision making (Hatch and Cunliffe 2006: 106; Martin and Fellenz 2010: 344; Griffin 1999; 340). Despite of formal authorities, the culture of the organization reflects lots of the daily practices. The non-routine decisions are moved one or two levels up in the command chain. Mintzberg (1983: 95) highlights that *centralization* can take place also in the horizontal direction if there are other unformal drivers for it. On the other hand, having more managerial *roles* brings an advantage to grow more leaders. The complexity of tasks and the high cross-functional nature of the work requires more managerial power (Galbraith et al. 2002: 91). The question, does the organization have too many managerial *roles* or not, should be addressed. The role of the manager shall be gone through from time to time in order to understand the value created (Galbraith et al. 2002). The *role description* of manager should also include the description as a member of management team. The manager should contribute to the big picture, at least one level higher than her or his own organization and for the overall business performance of the function. (Galbraith et al. 2002)

The next paragraphs describe the creation of the *hierarchy*. Cummings and Worley (2009) suggest that the last step in the re-engineering of the organization design is the creation of the new *hierarchical structure* around the *processes*. Benefits of the bottom to top approach are that the *functional* teams are empowered to achieve the *outcome* of

the whole *process*. Similarly, Morrison (1995: 175) suggests to start from the *responsibility matrix* and end up to the *hierarchical structure*. The *processes*, *functions, roles* and *responsibilities* create a base to establish the *hierarchical structure*. Morrison (1995) argues that the *process maps* need to be simplified and the researcher has to have understanding of the *status quo*. If the future of the organization is also clear, the *hierarchical structure* can be created. The rest of the work is about ensuring that the decision are made in the right level. Similarly, Cichocki and Irwin (2014) use the same approach to come from the *processes* and *functions* to *hierarchical structure* but they prefer to use more from top to bottom approach. They specify all the *roles* of higher level units before clarifying the roles of employees.

RAS *responsibility matrix* can be turned into the *hierarchical structure* via work percentage or letters (RAS). This means that if the percentage of the *responsibility* for each FTE can be clarified, the *hierarchical structure* also gives and input for the number of people needed. This study focuses on a strategic, operational and geographical aspects, and this is why letters (RAS) are used instead of numbers (e.g. the size of the *responsibility* is 0,2 times FTE or 20% of FTE). According to Morrison (1995), the creation of the *hierarchical structure* is started by creating the obvious senior *roles*. It should be understood that the senior *roles* are more complex and therefore difficult to define. These roles have lots of accountabilities. After this, the other clear strategic and operative *roles* which have a fixed amount of the work, should be added. Figure 16 shows the frequency and impact of the decisions to be made.

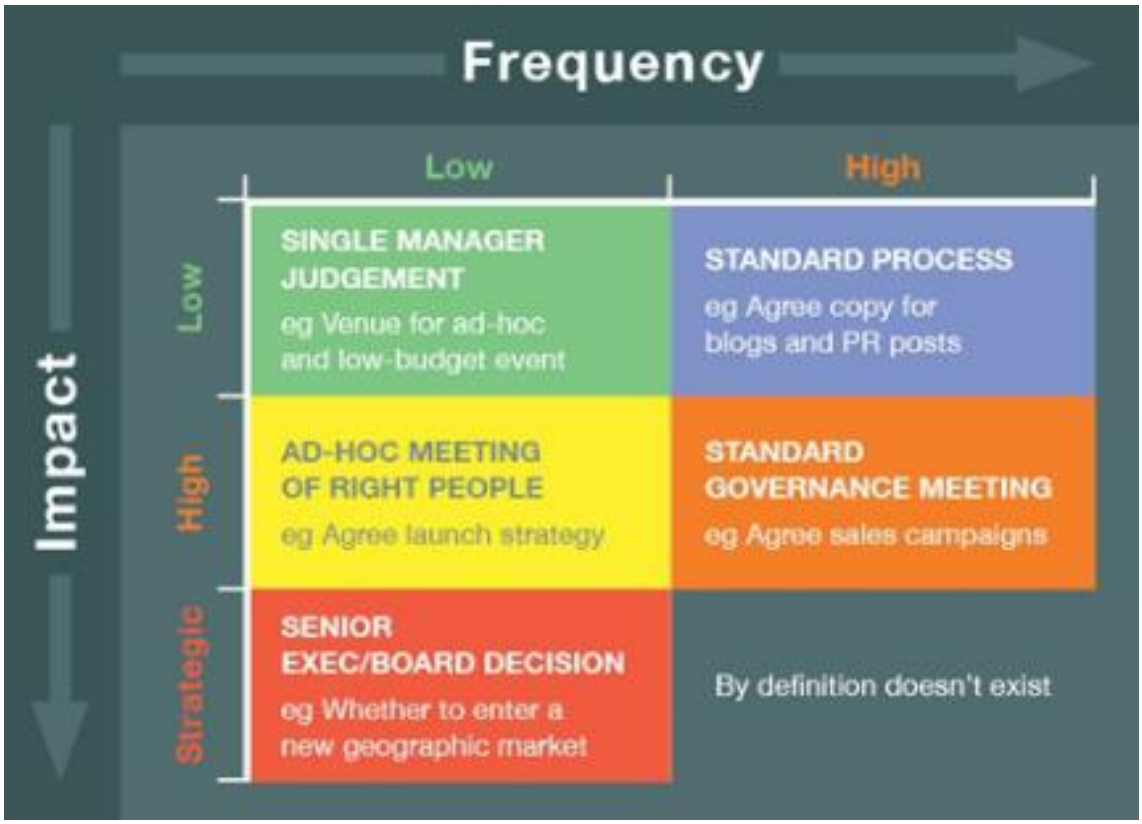


Figure 16. Organizational level of decision making matrix (Morrison 1995: 178).

As seen from Figure 16, it shows that the frequency of decisions is high for the standardized *processes* and that the high impact of decisions such as changes in a strategy are made occasionally by executives.

When moving from RAS *responsibility matrix* to the *organization chart*, Morrison (1995) suggests to evaluate the *organization chart* in the following seven steps: first, ensuring that each *responsibility* is on the right level in the hierarchy. Second, making sure that similar *responsibilities* are located in the same level in the hierarchy (If e.g. three levels exist). This means that the strategic *responsibilities* do not mix with the operative *responsibilities* if not intended to do so. Third, ensuring that all the *responsibilities* are linked to a *role* and they create clear accountability. Fourth, counting the work effort for variable *roles* to make sure that it is near one FTE. If there are many half FTEs, re-designing the roles should be considered. Fifth, ensuring that the *roles* are realistic: is it possible to find a person to fulfil the *role*. Sixth, testing that all engineering *responsibilities* belong to Engineers and the manufacturing *responsibilities* have not ended up for instance for Sales Manager. Seventh, calculate that the number of handoffs is realistic, meaning that the process does not involve too many *roles* to complete one simple work. Similarly,

Cichocki and Irwin (2014: 186) suggest to ensure that there are no undoable *roles*. Figure 17 shows the organization chart which is based on RAS *responsibility matrix*.

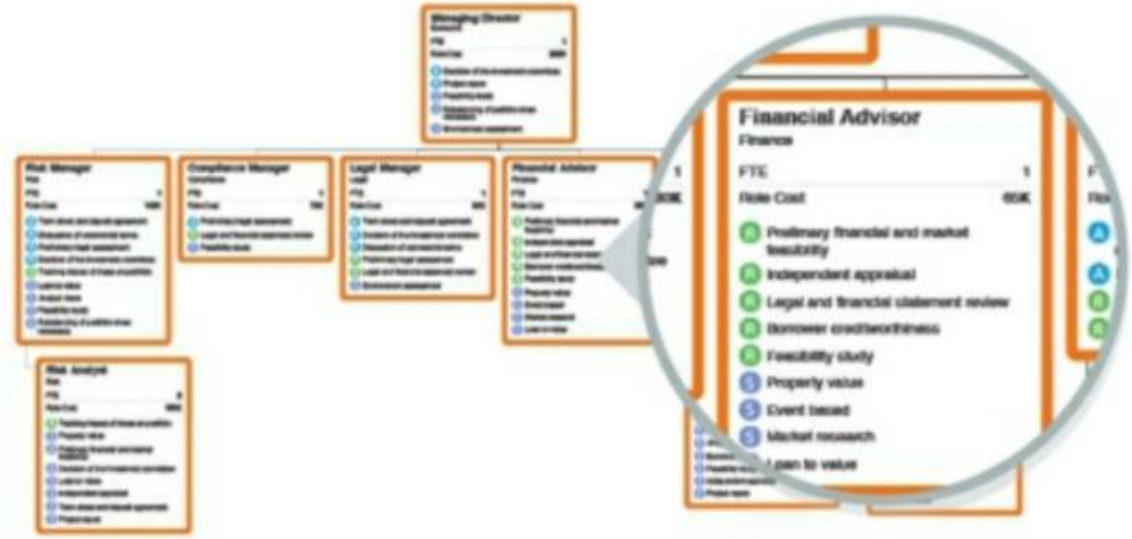


Figure 17. Organization chart as an outcome from RAS responsibility matrix tool (Morrison 1995: 42).

As seen from Figure 17, it shows an example of an *organization chart* in which the *approve responsibilities* are mainly located on the first and second level. The third level mainly has *support responsibilities and responsible responsibilities*.

According to Galbraith et al. (2002: 93), testing of the design is the major step in order to create the new *hierarchical structure*. The testing phase is described in the following six different steps: first, comparing the criteria to the proposal. Second, looking over the power balance. Especially geographical imbalances and *centralization* decisions should be grounded. Third, analyzing if the *hierarchical structure* supports the work flow. Despite the organization, people participating to the work should always have control over the process. However, one manager acting as a process owner should be defined in order to avoid different interests. Fourth, analyzing a suitability with the future trends. Fifth, completing a complexity analysis. Many *design criteria* may ask the organization to be highly complex. Customers and front line employees can indicate if the organization behind has become a monster. Sixth, comparing applicability of design for cultural circumstances. The organization design in an international old company rarely starts from an empty table. The history, values and the culture may pop up to the table when the implementation is initiated. Changes in the organization design might be limited because of long tenure deals and old hierarchical issues.

Summing up, the direct supervision, mutual adjustment and flat hierarchical structure are the base for the agile customer focused organization. However, the culture and additional needs for managers in the future may require the organization to establish more managerial roles than expected. The purpose of this section was to ensure a clear accountability for each role or position and to ensure that strategic and operational roles are on the right level. The logic from the *functions*, *processes, roles* and RAS *responsibility matrix* to create the *hierarchical structure* is a systematic approach but the final results need to be verified towards the design criteria. The *hierarchical structure,* the last building block of the *organization design* ensures that the organization has all the needed levels in the vertical direction. The next section presents the building blocks on a conceptual framework.

4.8 Conceptual Framework of This Thesis

The conceptual framework of this study consists of the four different building blocks: first, defining the *processes*. Second, defining the *functions*. Third, defining *roles* and *responsibilities*. Fourth, defining the *hierarchical structure*. Additionally, the importance of the *design principles* and the *design criteria* is shown.

Figure 18 shows the visualization and the chronological order of the four building blocks.

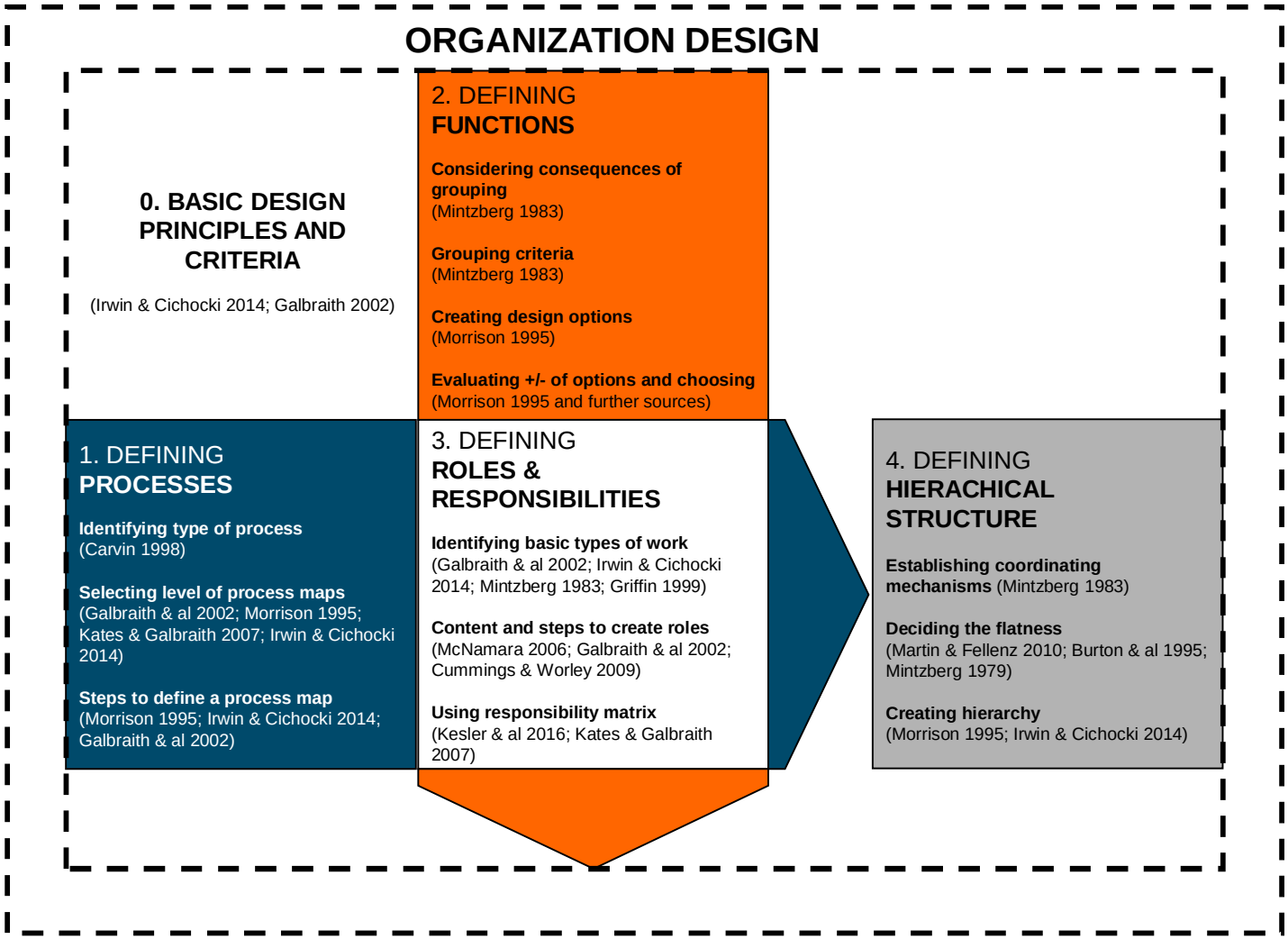


Figure 18. Conceptual framework for building organization design in this study.

As seen from Figure 18, the conceptual framework of the organization design is grounded to the basic *design principles* and the *design criteria*. First, the *processes* (blue) with the arrow pointing from left to right illustrating the horizontal progress of series of *responsibilities* in the *functional* department. Second, the *functions* which (orange) cut across the *processes*. Third, the *roles* and *responsibilities* (white) in the box in the middle of the conceptual framework. The *roles* locate in the different *functions* which serve the *processes*. Fourth, the *hierarchical structure* (grey) shows the hierarchy of employees.

The overview of the *organization design* was discussed in Section 4.1 because scholars suggest that the researcher has to have a broader overview compared to actual change in the organization. The *organizational change process* phases were discussed in Section 4.1 in order to limit the scope of this study and to develop the researcher's personal skills in the area of action research and to ensure that correct persons are involved with the change. Following this logic, the next paragraphs discuss about the details of the four selected building blocks of the conceptual framework.

The *processes* are discussed under three sub-blocks: first, the best practices for the processes suggest to separate the *different types of the processes* from each other. The work processes are in the scope of this study. This is why the rest of the building blocks are not discussed further on. Second, scholars suggest to create *different process maps* for different purposes. Level one process maps will be used because the scope of the study is not to improve the existing processes but to ground the base for the organization design. Third, scholars suggest different *step approaches* for creating and updating the process maps. Scholars suggest the list of questions to analyze the processes but they are out of the scope of this study because the study does not aim to improve the processes.

The *functions* are discussed under the four sub-blocks: first, building the independent functions has certain *consequences*. The grouping of people effect to a supervision, sharing of work load, sharing of KPIs and to the mutual adjustment. This is why the number of the functions needs to be considered in this study. Second, while the grouping of people has consequences, the way of grouping can be taken from different *grouping criteria*: 4 independencies: work flow, process, scale or social. Third, the term *design option* can be used in different areas of the organization design. However, creation of design options, weighting and rating are discussed in the context of departmentalization,

when defining the sub-functions. Fourth, the *summary of notes, strengths and weaknesses of the function departmentalization* is given in order to describe why organizations end up to the functional design.

The *roles* and *responsibilities* are discussed under three sub-blocks: first, the researcher has to be aware of the *type of the work*. The discussion around the formalization, the centralization and the specialization is sort of art in a management theory which brings added value for the researcher's personal skills. Second, the literature defines and describes the *content of the role description and the position description* and suggest *steps to create the roles*. Third, responsibility matrixes are *used to create the role descriptions*. Understanding the scope of the different kinds of responsibility matrixes is essential in order to avoid attempt to solve everything with these tools.

The *hierarchical structure* is discussed under three sub-blocks: first, the *hierarchical structure* is the most well-known term (structure, organization chart). The heart of the *hierarchical structure* is the home of employees and how they coordinate. The literature introduces the five *coordinating mechanisms*. Second, scholars have been arguing about the terms of tall and *flat hierarchical structure* for ages. Third, *the creation of hierarchy* from number of *responsibilities* leads to organization chart. The purpose is to make sure that the different types of *responsibilities* such as strategic and operational are located in the intended level in vertical direction. The bottom to top approach is used because it makes the functional teams empowered to achieve the outcome.

Best practice of the *processes*, *functions*, *roles*, *responsibilities* and *hierarchical structure* give the base for creation of the solution for the case company. The next section discusses about building the proposal.

5 Developing an Organization Design for the New Function

This section aims to merge findings from Data 1 and best practice from conceptual framework towards building a solution for the case organization.

5.1 Overview of Proposal Building Stage

The proposals were co-created with the key stakeholders starting from the *processes*. The number of the professional terms given in literature, the amount of the data and the distance between the two countries created some limitations for participation of employees. However, the four different co-creation workshops were arranged in three locations of two different countries.

Developing the proposal for the organization design for the newly established PTM organization consisted of six phases: first, the *responsibilities* were listed into RAS responsibility matrix. Only a few *responsibilities* were left away or modified because the summary of the current state analysis already sorted out not applicable *responsibilities* (Internal documentation: Product and Technical Management for EDG Services.pptx). Every responsibility was assigned R, A and S responsibility type, as a part of preparation for the co-creation workshop.

Next, the co-creation workshop was conducted. Before conducting it, general introduction material for the co-creation workshop was sent out for employees 13.4.2017 (Internal documentation: Product and Technical Management for EDG Services – Solution.pptx: slides 1-25). Every employee also received a personal e-mail regarding their *responsibilities* 13.4.2017 (Internal documentation: Organization Design Assistant role and responsibilities.pdf). Immediately before the co-creation workshop, general introduction material for the co-creation workshop was reviewed in the skype meeting 19.4.2017 (Internal documentation: Product and Technical Management for EDG Services – Solution.pptx: slides 1-25).

The first co-creation workshop was held around one *process* in Location C, second and third around the rest of the *processes*, *sub-functions*, *roles* and *responsibilities* and *hierarchical structure* in Location A and Location B (Internal documentation: Product and Technical Management for EDG Services – Solution.pptx: slides 26-43).

Overall, the proposal was built based on: (a) the outcome of the current state analysis (Section 3) (b) suggestions from literature and existing knowledge how to build the organization design for the newly established function (Section 4), and (c) input form the employees and the Director of EDG Services.

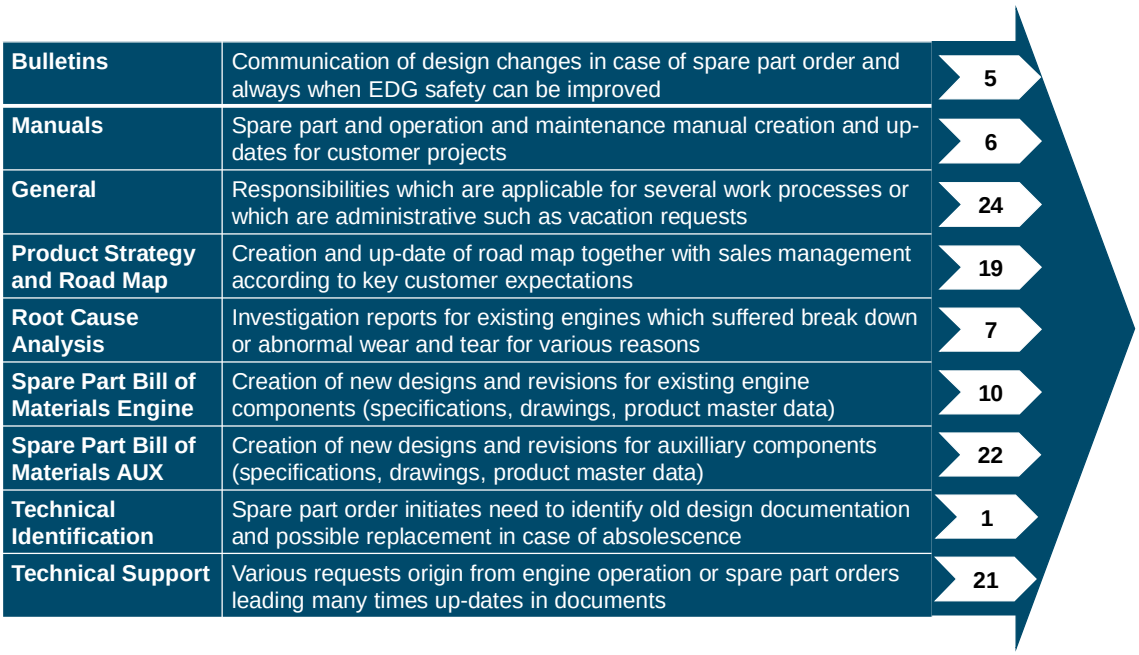
In the current state analysis, totally 115 *responsibilities* were identified. They need to be performed by 11 different *roles*, by totally 17 employees. The conceptual framework presented the tool to re-organize the newly established PTM organization. The proposal building stage involved the stakeholders into the co-creation workshops.

Next, this section describes how the results from the current state analysis, the literature suggestions and the input from the employees were utilized in order to create the proposal.

5.2 Designing Key Processes

Designing the *processes* was simple and straightforward. However, the identified high level *processes* had to be divided further on. The outcome of the work was the list of nine *processes*. The researcher made the draft of the *responsibilities* in a chronological order in order to show the starting point and ending point of the process. For some of the *responsibilities*, (especially 4. general), the chronological order could not be set up because they were not a part of the work *processes*. The final outcome regarding participants could only be finalized when the work with the *roles* and *responsibilities* was finalized.

Table 17 shows the new *processes*.



Bulletins	Communication of design changes in case of spare part order and always when EDG safety can be improved	5
Manuals	Spare part and operation and maintenance manual creation and up-dates for customer projects	6
General	Responsibilities which are applicable for several work processes or which are administrative such as vacation requests	24
Product Strategy and Road Map	Creation and up-date of road map together with sales management according to key customer expectations	19
Root Cause Analysis	Investigation reports for existing engines which suffered break down or abnormal wear and tear for various reasons	7
Spare Part Bill of Materials Engine	Creation of new designs and revisions for existing engine components (specifications, drawings, product master data)	10
Spare Part Bill of Materials AUX	Creation of new designs and revisions for auxilliary components (specifications, drawings, product master data)	22
Technical Identification	Spare part order initiates need to identify old design documentation and possible replacement in case of absolescence	1
Technical Support	Various requests origin from engine operation or spare part orders leading many times up-dates in documents	21

Figure 19. Overview of content and number of responsibilities for nine processes.

As seen from Figure 19, the number of *responsibilities* for one process is indicated on the right side of the figure. However, this number cannot be used to count work load in each of the *processes*. All responsibilities in chronological order in level one process map are seen in Appendix 2.

5.3 Designing Key Functions

The starting point was that the employees that were located in three locations and their previous organization design that led them into the five different *sub-functions*. In order to get familiar with the functional departmentalization, the following point should be kept in mind: if more *sub-functions* are created, it may improve specialization but it also has the tendency to create organizational silos.

The creation of the design options, weighting and rating are discusses in the context of departmentalization in this study, when defining *sub-functions*. The researcher merged three sub-blocks from the conceptual framework to create a table for the design options. This section aimed to find a solution if the newly established PTM organization should have one, two, three, four or five *sub-functions*. Table 24 shows the table of the design options which was reviewed in the workshop 4.

Table 24. Design options for sub-functions.

A	Rating of design options	Independencies (PTM): Weighting = in scale 1-4	1 Work Flow = Beginning of Technical Support is one and end of Technical Support is another	2 Process = All processes would have own function: TS, TI, PM, OTHER, ENGINE 4 / AUX	3 Scale = sharing of 17 employees based on mathematics	4 Social = Location A, Location B and Location C are all different functions	5 Other = Engine Experts make a new function reporting to GM
B	**Consequences: what happens inside the sub-function? = in scale 1-3**	**Is the option possible in practice?**	NA, several short processes	Yes, keep it like today	NA, amount of work load not in scope	Yes	Yes
C	**Direct supervision = Expectation: Considering to recruit manager to look over tasks completed in Location B and Location A.**	1	NA	2	NA	3	3
D	**Sharing of workload = Expectation: Improving management of people together with Location B factory.**	2	NA	2	NA	3	3
E	**Same KPIs = Creating an organization which change focus from the products to the customers.**	3	NA	2	NA	2	2
F	**Mutual adjustment = Strength: Collaboration inside PTM (one location) who are working for ENGINE 1 is good.**	4	NA	2	NA	1	3
G	**Total**	10	NA	2,0	NA	1,9	2,7

As seen from Table 17, *consequences* i.e. design criteria are on the left side (rows from C to F). Design options are on the top of the table (row A). These two elements were created as follows.

First, the literature is used as follows: designing of *sub-functions* has certain consequences for supervision, sharing of work load, sharing of KPIs and the mutual adjustment. This is why these four consequences were set up as design principles from the

literature. The design principles are general, this is why also design criteria needs to be set up (second column on left). The design criteria was taken from expectations from designers of new organization and from strengths of existing elements.

The four design criteria for the newly established PTM organization were rated in the scale of 1 to 4: The number 1 describes low importance from the newly established PTM organization's point of view. If the newly established PTM organization should aim for strong supervision, number 4 is the rate for this design criteria. Second, if the newly established PTM organization aims to share the work load as much as possible, number 4 is the rate for this design criteria. Third, if the newly established PTM organization should use the same KPIs, number 4 is the rate for this design criteria. Fourth, if the newly established PTM organization should have good mutual adjustment, number 4 is the rate for this design criteria. In order to prioritize the different design criteria, each number was used only once. The weighting was performed by the researcher based on the findings of the current state analysis.

Second, the literature is used as follows. The number of *design options* was taken from the grouping criteria, 4 independencies: work flow, process, scale or social (first row on the top). While the design criteria were rated from the newly established PTM organization's point of view, the four design options were rated by evaluating benefits inside one sub-function.

The three applicable design options for the newly established PTM organization were rated in the scale from 1 to 3: If the design option does fulfil the design criteria, number 3 is the rate for this design option. If the design option does not change status quo, number 2 is the rate for this design option. If the design option does not fulfil the design criteria, number 1 is the rate. All the numbers can be used several times. The weighting was performed by the researcher based on his own understanding of the newly established PTM organization.

In Design option 1, the newly established PTM organization's *sub-function's processes* are short. This is why work flow based grouping is not an option. Additionally, the same employees work for many different *processes*, hence this grouping option it is not applicable for the newly established PTM organization. In Design option 2, if all the nine *processes* would have their own sub-functions for 17 employees, the departmentalization

would be meaningless. This is why the current *hierarchical structure* with the four different *sub-functions* is proposed. In Design option 3, the analysis of the work load was not in the scope of the study. This design option suits for bigger scale organizations. This option would also have limitations. The limitations would come from the employees' capabilities because the employees should leave the current duties and take the new ones. In Design option 4, all three locations would formulate their own sub-function. This is why it is an applicable option. However, it would also mean that the organization has one Design Engineer in Location A and another Senior Design Engineer in Location B. In Design option 5, all Engine Experts would report directly for the researcher similarly as Senior Technical Superintenders. This design option was created based on the organizational capabilities found in the current state analysis.

As a result of the proposal building, Design options 2 and 4 are identified as equally strong options (Table 17: row G; 2,0 and 1,9) but the tool supports the selection of Design option 5 (Table 17: row G; 2,7). However, the decision cannot be taken only based on this. In order to use the tool as one and only basis for the decision, the weighting and rating should be performed with the employees of the newly established PTM. All three draft proposals were presented at the fourth co-creation workshop by the researcher. After this, the employees formulated their own opinion alone for each three design options. The proposal was created in the fourth co-creation workshop. The employees' opinions were presented after each figure of the design options. Figure 20 shows one of the design option seen in Table 17.

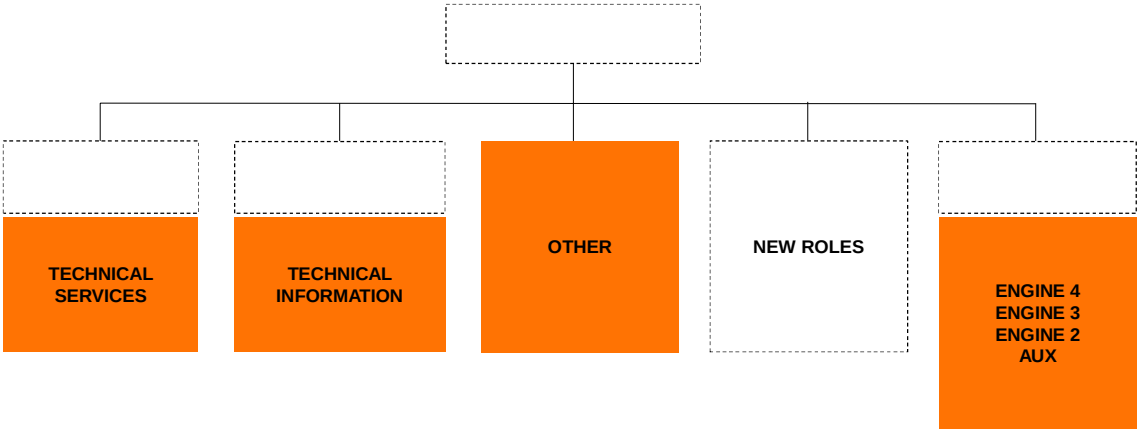


Figure 20. Design option 2 for workshop 4, Data 2.

As seen from Figure 20, the Design option 2 is based on *processes* grouping criteria. This design option has four *sub-functions*. The outcome of the fourth co-creation workshop was that managers have a good understanding of the work, the work load and the priority of the work. This design option enables managers to share the work load between each employee and negotiate about the priority with internal customers. The weaknesses of this design option are that it leads to several hierarchy levels and therefore decision making can take a long time. Figure 21 shows one of the design options shown earlier in Table 17.

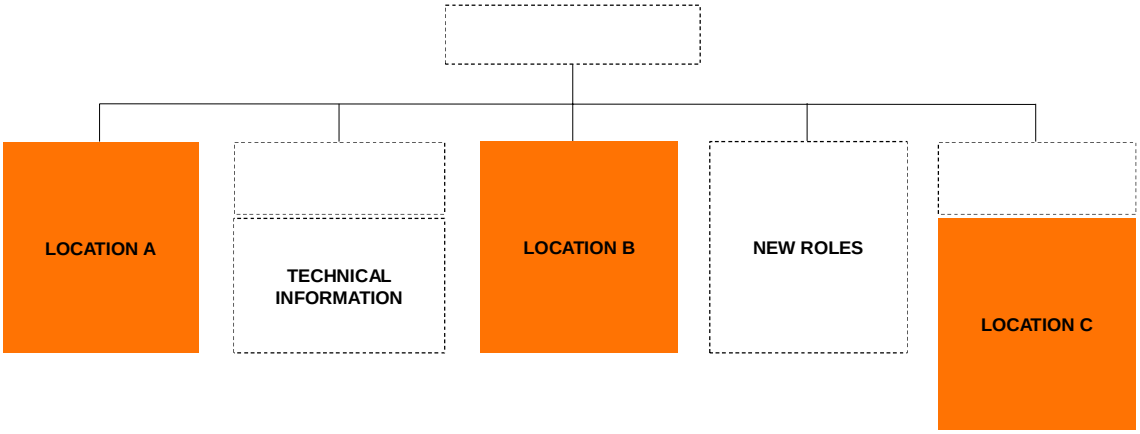


Figure 21. Design option 4 for workshop 4, Data 2.

As seen from Figure 21, the Design option 4 is based on the social grouping criteria. This design option has three *sub-functions*. The outcome of the fourth co-creation workshop was that social *sub-functions* may be easy to manage administratively but are challenging in sense of communication and knowledge sharing between the locations. There is a risk of conflict which does not support the creation of the global organization. Figure 22 shows one of the design options shown earlier in Table 17.

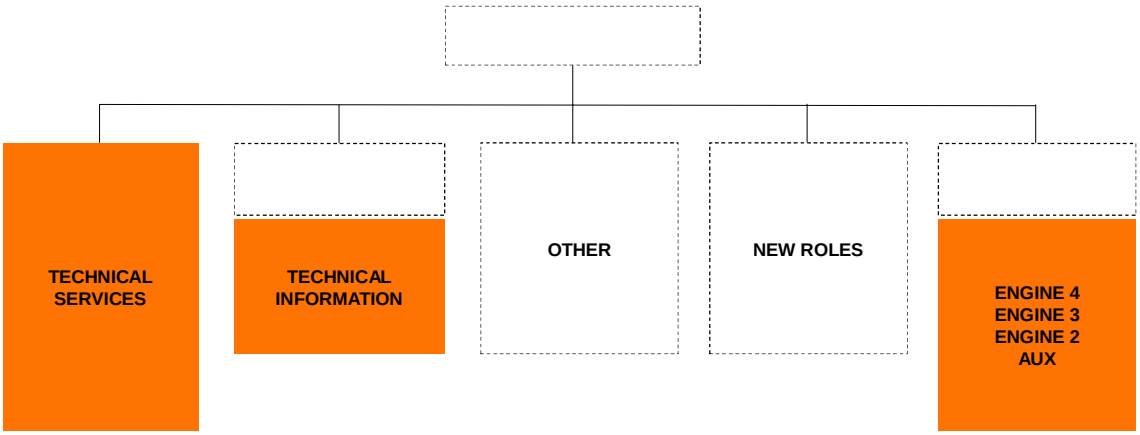


Figure 22. Design option 5 for workshop 4, Data 2.

As seen from Figure 22, the Design option 5 is based on other grouping criteria. This design option has three *sub-functions*. The outcome of the fourth co-creation workshop was that this design option enables effective communication between the employees. This design option produces quick answers to internal and external customers but there is a risk for the managers to lose control. Especially *sub-function* Technical Services may be challenging because the researcher has a high span of control ratio: 1:12. The work load of the managers is not equally shared. The employees might find it challenging to know priorities and what needs to be escalated for the management. The employees highlighted that there is a need for regular meetings of the complete *sub-functions* to avoid that two employees would be working with the same case.

This section presented metrology to create *sub-functions* for the newly established PTM organization. The summary for the *sub-functions* is that the newly established PTM organization will continue with the Design option 2. The *processes* grouping criteria is selected because it enables prioritization and sharing of work load in the best possible way with the current organizational capabilities.

5.4 Designing Key Roles and Responsibilities

The conceptual framework offered two sub-blocks as background information for the researcher. Additionally, the third sub-block was used as a training material for the employees: the purpose of the co-creation workshop was to identify the *responsibilities* which cannot be solved with the RAS tool. Hence, additional comments were written down for further processing, in case the *responsibilities* could not be solved alone by this tool. Starting point to design the *roles* and *responsibilities* was that *roles* were existing and no new *roles* were opened. Before the co-creation workshops, the researcher drafted the responsibility matrix in order to transfer the design criteria to the new organization. The employees were requested to review their own *responsible responsibilities* (R) and accordingly give feedback if the description is understandable. If the employees wanted to change something, there had to be a proposal who would cover the responsibility.

Next, the employees were requested to review *support responsibilities* (S). The organization is small, hence many people can contribute to the tasks. Therefore it was agreed that *support responsibilities* are assigned if the work takes more than 30 minutes.

After this, the *responsible* was requested to consider if there are too many S or if some S are missing. Before co-creation workshops, the researcher divided one *role* of Engine Expert into two different *roles* according to the locations: Location A and Location B. The idea behind was that the *roles* will be different based on location. By this decision, Engine Experts in Location B can be allocated to support Location B factory more. The co-creation workshops 1, 3 and 4 were used to agree *responsibilities*.

Table 25 shows proposal for General process *responsibilities*.

Table 25. RAS responsibility matrix for General process responsibilities.

Responsibilities	Technical Manager	Engine Expert Location A	Engine Expert Location B	Senior Design Engineer	Design Engineer	Design Engineer new	Assistant	Product Manager ENGINE 1	Senior Material Expert	Senior Technical Superintendent	Design Engineer, External	Chief Design Engineer, External	Product Engineer, External	Product Engineer, Technology, Marine Solutions	Product Manager ENGINE 4 /ENGINE 3 /ENGINE 2 /AUX	GM, PTM	OTHER PTM (Create a new postion)	OTHER FUNCTION (EDG Services)	Operative / Strategic
Distribute Technical Request	R																		
Give support for users of SAP (Key user)						R											R	R	
Prioritize between customers																A		A	S
Call seminar to share information regarding welds, investigations etc.									R										
Give support for users of Apollo Root Cause Analysis tool (Key user)	R																		
Give support for users of Technical Request tool (Key user)										R									
Prioritize between Root Cause Analysis, Technical Request and Sales Support								S							S	R		A	S
Approve travel reports	R			R												R	A		
Approve travel requests	R			R												R	A		
Approve vacation requests	R			R												R	A		
Call monthly meeting for PTM																R	A		
Call weekly or bi- weekly meeting between Location A and Location B																R			
Communicate instructions for working hours reporting							R												
Coordinate travelling in EDG Services							R												
Coordinate vacation requests in PTM							R												
Create and up-date processes descriptions								S							S	S	R		
Create differend kind of customers specific letters	R	S	S					S		S					S				
Create monthly report for EDG Services management team	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	R	R		
Develop and maintain key competence of the team	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	R			S
Ensure working hours reporting in SAP	R	R	R	R	R	R	A	R	R	R	R	R	R	R	R				
Participate to customer and authority audits	R	R		R				R							R	R	A		
Participate to EDG Services Quality Forum								S							S	R	A		
Report quality defects (10 CRF Part 21)	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		A		
Up-load documents to PTM server and distribute them							R												

As seen from Table 25, the responsibility matrix had 15 *roles* in total. The list of the *roles* included additional columns for “OTHER PTM” and “OTHER FUNCTION” in case the responsibility did not have clear *responsible*, *approve* or *support responsibilities*. This ensured that the outcome of the responsibility matrix could be utilized when opening new positions in the future. Additionally, the column “OTHER FUNCTION” can be used as an input for the interfaces of the newly established PTM organization. All the *responsibilities* are found from Appendix 2.

Table 26 shows role description for Product Manager ENGINE 1.

Table 26. Role description for Product Manager ENGINE 1.

Product Manager ENGINE 1
Approve
Up-date Operation and Maintenance Manuals
Up-date Spare Part Catalogue
Responsible
Create a product roadmap
Develop, maintain and communicate the long term strategy for own products
Participate in feasibility studies and relevant market analysis for own product
Prioritize with Sales Management (identify customer needs: annual overhauls, out takes)
Define Spare Part strategy
Define Spare Part Catalogue strategy
Ensure that product master data is suitable for an existing sales tools and processes
Develop and maintain obsolescence and Bulletins processes together with other product managers
Maintain or improve the commercial performance of own products
Ensure communication with Customer Assistance Centre, Technical Services, Technical Information, Product Management and Pricing of 4-stroke Engine Services
Clarify EDG requirements in own responsibility area for 4-stroke Engine Services
Communicate business opportunities over 4-stroke Engines (profitability, internal selling)
Act as product spokesperson in relevant internal, cross-divisional and external forums
Participate in technical and commercial meetings with customers
Create design change management documents (FMN) for ENGINE 1
Guide implementation EDG Services spare part strategy
Define list of spare parts to be delivered with supplier taking into account profit, delivery time and cost
Participate to customer feedback meeting
Ensure working hours reporting in SAP
Participate to customer and authority audits
Report quality defects (10 CRF Part 21)
Support
Ensure sales support for ENGINE 4, ENGINE 2, ENGINE 3 and auxiliary components
Improve continuously product management processes and tools of Shared Business Operations for global EDG Services organization
Communicate business opportunities over EDG Services organization (profitability, internal selling)
Approve content of change management documents (FMN) to be communicated for EDG customers
Create Bulletins for ENGINE 7, ENGINE 8, ENGINE 1
Approve content of Bulletins to be communicated for EDG customers
Communicate EDG electrical and automation Obsolecence Management issues with Technical Service 4-stroke Engine Services
Ensure availability of experts from Finland to participate to Root Cause Analysis
Prioritize between Root Cause Analysis, Technical Request and Sales Support
Create and up-date processes descriptions
Create differend kind of customers specific letters
Create monthly report for EDG Services management team
Develop and maintain key competence of the team
Participate to EDG Services Quality Forum

As seen from Table 26, this role includes 2 *approve*, 21 *responsible* and 14 *support responsibilities*. Table 27 shows the overview of the *responsibilities* in process and sub-function context.

Table 27. Overview of responsibilities in process and sub-function context.

	Sub-function Technical Services	Sub-function Technical Information	Sub-function Other	Sub-function ENGINE 4 ENGINE 3 ENGINE 2 AUX
1	Purpose of change and content of change	NA	Purpose and content of change, document form	NA
2	Content of change and support for others	NA	Strategy, logic, sellability	Content of change for projects and auxilliary
3	Prioritization of Technical Requests, quality reporting	Quality reporting	Support for work processes, quality reporting	Quality reporting
4	Use of common tools in order to help selling	Ensure quality of master data	Strategy and communication	Support for strategy and tools
5	Perform investigation for engine	NA	Perform investigation for component	NA
6	Reason for change	Create and up-date designs	Manufacturing and material information	Create and up-date designs
7	NA	NA	NA	Create and up-date designs
8	NA	NA	NA	NA
9	Knowhow and F2F in workshop	Support for change management of master data	Customer feedback and knowhow	Support for auxilliary equipment

As seen from Table 27, *sub-functions* Technical Services and Other have the widest scope of work while *sub-functions* Technical Information and ENGINE 4, ENGINE 3, ENGINE 2 and AUX focus on creating and updating design. In some of the *processes* (rows 3, 4, 6 and 9), all four *sub-functions* have *responsibilities* but there are also *processes* in which the newly established PTM organization's contribution is insignificant (rows 7 and 8).

5.5 Designing Hierarchical Structure in a Sub-function and Process Context

Creation of the *hierarchical structure* considered three sub-blocks originating from the conceptual framework. The section summarizes the outcomes and evaluates the results from the previous steps. First, the five coordinating mechanisms forces the researcher to consider, which of these five coordinating mechanisms are applicable for this organization. The answer lies in the understanding the tasks and the expectations from the designers of the new organization. Designers of the new organization expect that the new organization is flexible to deliver specific services to the customer. This type of business deviates from many other customer segments by requiring very non-standard services. As a conclusion, standardization of skills, processes and outputs cannot be seen

as a solution in the case organization. Therefore, the newly established PTM organization has to focus on the *mutual adjustment* and *direct supervision*.

Second, the existing organization design had 1:1 (Technical Information), 1:4 (Technical Services) and 1:8 (PTM) span of control ratios. The managerial role of the Senior Design Engineer is tall, the role of the Technical Manager is average and the role of the General Manager is flat. The ratio is not alarming but the number of managers were discussed in the fourth co-creation workshop. The current organizational capabilities do not offer new managerial resources, thus the organization may end up with a very flat span of control in the future. While the *hierarchical structure* does not offer new solutions to improve direct supervision, the newly established PTM organization needs to trust for an improvement of the mutual adjustment. The improvement of the mutual adjustment will be initiated by decision to call bi-weekly meetings. This responsibility to call meetings is signed for the researcher.

Third, the creation of the *hierarchical structure* was suggested to be further developed by using the RAS responsibility matrix. This means that, first, the *responsibilities* without *roles* were identified. These *responsibilities* were allocated to column “OTHER PTM”. The outcome of this column was that the new possible role could share many different types of *responsibilities*. However, the list of the *responsibilities* did not create any new specific role. Table 28 is the summary of R, A and S responsibilities in the different levels. The table is established to ensure the power distribution in the newly established PTM organization.

Table 28. Allocation and number of RAS responsibilities and strategic responsibilities.

	Role	**Level**	**R**	**A**	**S**	**Strategic**
1	General Manager	1	16	29	14	4
2	Technical Manager	2	18		13	
3	Senior Design Engineer	2	9		5	
4	Product Manager ENGINE 4/ENGINE 3/ENGINE 2/AUX	2	32	2	13	10

As seen from Table 28, first, the General Manager of the newly established PTM organization has 29 *approve responsibilities* in the whole new PTM organization. This decision enables the General Manager to have visibility and authority to make decisions. Instead,

only 4 out of 16 *responsible responsibilities* of the General Manager are strategic. This is explained with the fact that many strategic decisions will be done by EDG Services.

Second, Product Manager ENGINE 4/ENGINE 3/ENGINE 2/AUX has only 2 *approve responsibilities* in the whole new PTM organization. These two *approve responsibilities* are for manuals. Instead, 10 out of 32 *responsible responsibilities* are strategic. The high number of *responsible responsibilities* is explained with accurate work break down and recruitment of 4 new *roles* during the current state analysis. The high number of the strategic *roles* is explained by the life cycle of ENGINE 4 product; it is in the beginning and many decisions have not been taken. Table 29 shows how all strategic *responsibilities* on a more detail level.

Table 29. Content of strategic responsibilities.

Responsibilities	Technical Manager	Engine Expert Location A	Engine Expert Location B	Senior Design Engineer	Design Engineer	Design Engineer new	Assistant	Product Manager ENGINE 1	Senior Material Expert	Senior Technical Superintendent	Design Engineer, External	Chief Design Engineer, External	Product Engineer, External	Product Engineer, Technology, Marine Solutions	Product Manager ENGINE 4/ENGINE 3/ENGINE 2/AUX	GM, PTM	OTHER PTM (Create a new postion)	OTHER FUNCTION (EDG Services)	Operative / Strategic
Create a product roadmap	S	S	S					R		S			S	S	R	S		A	S
Develop, maintain and communicate the long term strategy for own products	S	S	S					R		S			S	S	R	S		A	S
Participate in feasibility studies and relevant market analysis for own product								R							R	A		A	S
Prioritize with Sales Management (identify customer needs: annual overhauls, out takes)								R							R	S		A	S
Define Spare Part strategy		S	S					R		S			S	S	R	S		A	S
Define Spare Part Catalogue strategy		S	S					R		S			S	S	R	A			S
Define Spare Part prices for different EDG customers																S		R	S
Ensure that product master data is suitable for an existing sales tools and processes				S	S			R			S	S	S	S	R	A		S	S
Develop and maintain obsolescence and Bulletins processes together with other product managers				S	S			R			S	S			R				S
Maintain or improve the commercial performance of own products								R							R	S		S	S
Define list of spare parts to be delivered with supplier taking into account profit, delivery time and		S						R		S					R	S			S
Prioritize between customers																A		A	S
Prioritize between non EDG Root Cause Analysis and EDG Root Cause Analysis		S	S							S						R	A		S
Prioritize between non EDG investigations and EDG investigations									S							R	A		S
Prioritize between Root Cause Analysis, Technical Request and Sales Support								S							S	R		A	S
Develop and maintain key competence of the team	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	R			S

As seen from Table 29, there are 5 *responsibilities* related to the prioritization. The prioritization between customers and different *processes* were allocated on the first level and to other *functions* of EDG Services. The sharing of the workload and the distribution of Technical Requests were allocated for the second level. The prioritization of Technical Request is operative work and was excluded from this table. Special attention was paid to the prioritization of the work because it was identified as an improvement area in the current state analysis. Operative Technical Support given via Technical Requests and

locally in the Location B factory were allocated for the third level in the organization because of the complexity and the number of the details in the work. Figure 23 shows the final proposal for the *hierarchical structure*.

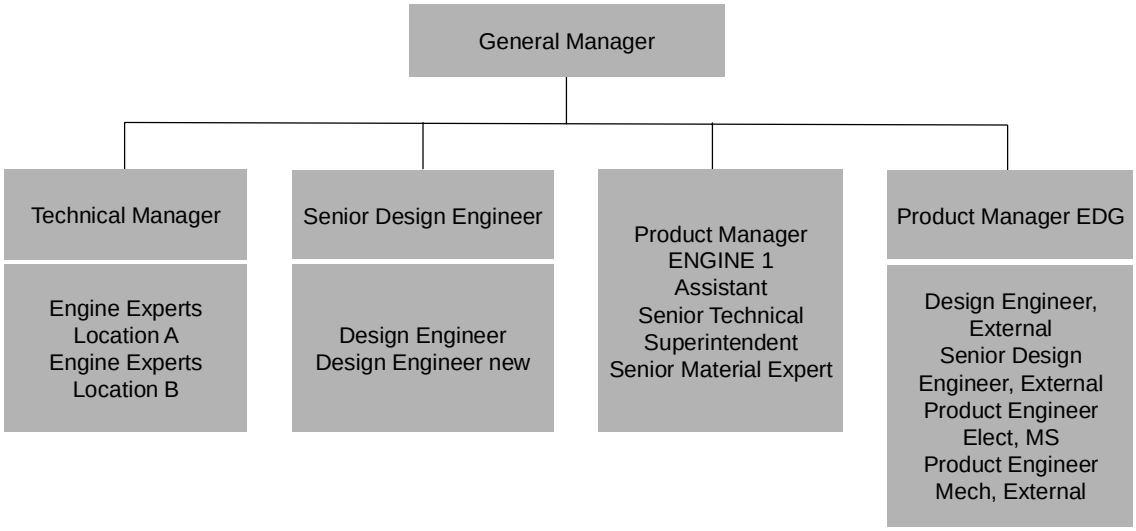
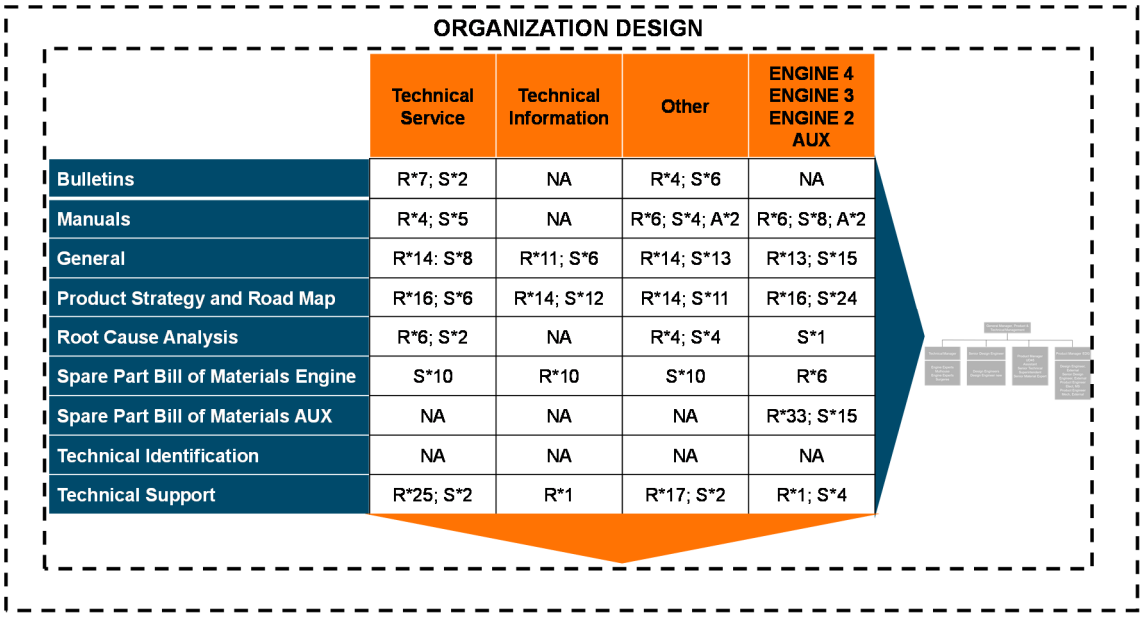


Figure 23. Hierarchical structure including roles, Data 2.

As seen from Figure 23, the box describing sub-function called “New roles” was removed for two reasons. First, the expectations from the designers of the new organization who are part of EDG Services pointed out that this kind of operative *roles* remain in the 4-stroke Engine Service. Second, the list of the *responsibilities* does not create any specific new *role*. Summing up, the *hierarchical structure* of the newly established PTM organization consists of 16 *roles* in three levels.

5.6 Final Proposal

The final proposal combines the proposed solution into the conceptual framework of this study. Figure 24 shows the final proposal for the organization design for the newly established function.



	Technical Service	Technical Information	Other	ENGINE 4 ENGINE 3 ENGINE 2 AUX
Bulletins	R*7; S*2	NA	R*4; S*6	NA
Manuals	R*4; S*5	NA	R*6; S*4; A*2	R*6; S*8; A*2
General	R*14: S*8	R*11; S*6	R*14; S*13	R*13; S*15
Product Strategy and Road Map	R*16; S*6	R*14; S*12	R*14; S*11	R*16; S*24
Root Cause Analysis	R*6; S*2	NA	R*4; S*4	S*1
Spare Part Bill of Materials Engine	S*10	R*10	S*10	R*6
Spare Part Bill of Materials AUX	NA	NA	NA	R*33; S*15
Technical Identification	NA	NA	NA	NA
Technical Support	R*25; S*2	R*1	R*17; S*2	R*1; S*4

Figure 24. Organization design for PTM.

As seen from Figure 24, the nine different *processes* (blue), the four different *sub-functions* (orange), 16 *roles* and 115 *responsibilities* (white) including number of R, A and S and the *hierarchical structure* (grey) are shown.

The creation of the proposal started already in the current state analysis but the details of the organization design were created in this section. The next section presents the results of the validation and feedback given by the Director of EDG Services.

6 Management Validation and Feedback on the Proposed Organization Design

This section discusses about the results of the validation and feedback received from the Director of EDG Services.

6.1 Overview of Validation Stage

Section 3 presented the list of the expectations for the different building blocks of the organization design, as reveled from the current state analyses. The logic of Section 6 follows the same logic as used in the previous sections by showing the expectations for the *processes*, *sub-functions*, *roles*, *responsibilities* and *hierarchical structure*. The specific feedback is given for each of four building blocks of the organization design.

However, it should be noted that in the previous stage, in Section 3, the expectations of the designers of the new organization included totally 11 leaders from the old 4-stroke Engine Services and as well as from all members of EDG Services management team. In addition, the expectations from the external customers and the authorities are included to this section. However, the scope of the study was limited to exclude interfaces from the newly established PTM organization to other *functions*, and this is why the feedback is collected only from the researcher's supervisor, Director of EDG Services.

6.2 Developments to the Proposal Based on Findings

The meeting was started by discussing about the contribution of the employees. The employees discussed about the expectations and the importance of utilization of existing resources in Location A despite the strategical decision to open all new positions in Location B.

Table 30 shows the validation and feedback for the *processes*.

Table 30. Validation and feedback for the processes.

	Relates to	**Expectations**	**Fulfil or not?**
1	Processes	*creating* an organization and creating clear roles to avoid too much process related way of working	OK. AUX process has huge number of responsibilities but this understandable because of development of ENGINE 4.
2	Processes	*making sure* of the use of common tools of 4-stroke Engine Services: Technical Request and Bulletins	OK. The tools are also needed for non EDG engines.
3	Processes	*ensuring* correct use of Technical Request tool and consider other processes for long term projects	OK. Location B factory or Root Cause Analysis are excluded from Technical Request tool.

As seen from Table 30, the expectations are met with some comments. It is possible that also second level process maps need to be created in the future.

Table 31 shows the results from the validation and feedback for *sub-functions*.

Table 31. Validation and feedback for sub-functions.

	Relates to	**Expectations**	**Fulfil or not?**
1	Sub-functions	*creating* an organization which change focus from the products to the customers	OK. Communication is a key on the road to success. The fulfillment will be measured later on.
2	Sub-functions	*improving* management of people together with Location B factory	OK. Difficult to solve with sub-functions because there are still old barriers between functions.
3	Sub-functions	*considering* to recruit manager to look over tasks completed in Location B and Location A	Not OK. It is recommended to make decisions which support strategy.

As seen from Table 31, (row 3) the need of the new manager is a must for Location B because the newly established PTM organization does not have many managers today.

Table 32 shows the results from the validation and feedback for *roles* and *responsibilities*.

Table 32. Validation and feedback for roles and responsibilities.

	Relates to	**Expectations**	**Fulfil or not?**
1	Roles and responsibilities	*leading* the big picture of EDG activities in Services and using resources from 4-stroke Engine Services according to needs of EDG business	OK. Operative resources for pricing will remain in 4-stroke Engine Services.
2	Roles and responsibilities	*clarifying* work effort for ENGINE 4, ENGINE 2 and ENGINE 3 and built size of organization accordingly	OK. Communicate needs of PTM for Technical Services of 4-stroke Engine Services about ENGINE 2 and ENGINE 3. Part time solution for spare parts of ENGINE 4: OK.
3	Roles and responsibilities	*agreeing* roles and responsibilities for electrical and automation of ENGINE 4, ENGINE 2 and ENGINE 3	OK. Make sure that agreed roles are also communicated.
4	Roles and responsibilities	*defining* global roles and responsibilities in order to make sure organization is not too fragmented	OK. Global roles means also that external companies are need for engineering and qualification.
5	Roles and responsibilities	*improving* co-operation and team spirit in Location B with PTM and Operations Management NS for average delivery of EDG engines of X months and X week	OK. Engine Expert allocation for Location B factory has been done. The next step is creation of good relationships.

6	Roles and responsibilities	*defining* the roles, responsibilities and competence requirements in Bulletins process	OK. Technical Manager is signing change management documents (FMN) instead of General Manager.

As seen from Table 32, the engineering and qualification resourcing shall be outsourced. The usage of the common engineering tools with 4-stroke Engine Services shall be planned.

Table 33 shows the results from the validation and feedback for *hierarchical structure*.

Table 33. Validation and feedback for hierarchical structure.

	Relates to	**Expectations**	**Fulfil or not?**
1	Structure	*creating* long term plan for PTM that the replacements and the new employees for ENGINE 1 locate in Location B	OK. Strategy has to be the driver for the decisions.
2	Structure	*improving* the French organization to carry responsibility and create visibility to activities taking place in France	OK. This requires strong decisions and fast responses.
3	Structure	*utilizing* organizational change and position of GM of PTM having authority to decide	OK. Be fair and tough.

As seen from Table 33, it was discussed that the organizational capabilities need to be developed remarkably during the next two years. In France, finding a manager with technical background means that he or she has to have 15-20 years' experience in the industry. Interfaces of the newly established PTM organization were discussed because there were lots of expectation for that specific area.

6.3 Summary of Final Proposal

Based on the feedback, the organization has to grow to give more advanced technical support for EDG Services. Figure 25 shows the final proposal after feedback.

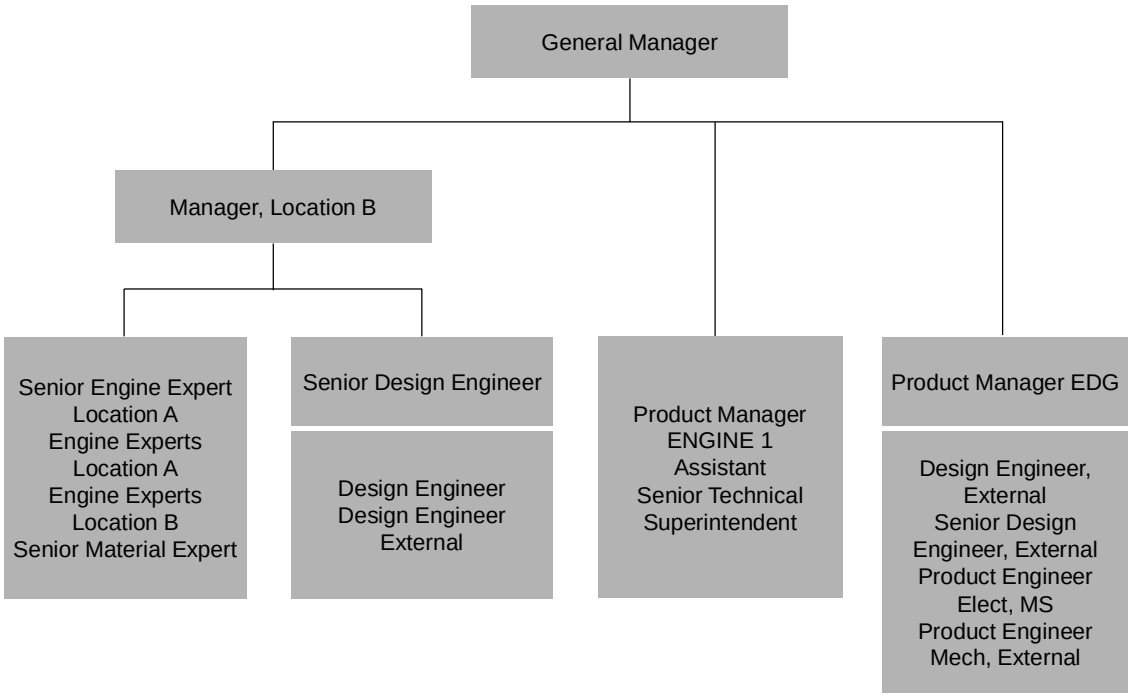


Figure 25. Proposed hierarchical structure including roles after the feedback.

As seen from Figure 25, the role of the Technical Manager will be changed to the Senior Engine Expert Location A.

The role of Technical Manager will be changed by moving leadership and management *responsibilities* for the new local manager located in Location B. The *hierarchical structure* of the newly established PTM organization should contain the role of Manager, Location B in the end of 2017.

The Senior Material Expert will be located in Technical Services sub-function. Resources to Technical Information have to be found from external engineering companies. The Senior Technical Superintendents remains in *sub-function* Other in order to ensure support to all electrical and automation components in the newly established PTM organization.

7 Conclusions

This section contains the description of the results of the Thesis made for the newly established Product & Technical Management function. The section also gives recommendations in order to start to deliver to the customer with the new organization design. The evaluation of the Thesis is also presented.

7.1 Executive Summary

The purpose of the Thesis was to develop an organization design for the newly established Product & Technical Management function, which is one of five functions of EDG Services. The newly established PTM organization supplies Technical services, Technical information and Product management services as an owner of engine products over the whole lifecycle of the products. However, in order to create a new competitive edge from the existing elements, a more detailed organization design was needed, especially in relation to the roles and responsibilities in the newly established PTM organization.

The research approach applied in this Thesis was Action research since it relies on a high degree of involvement of people in the organization. The participative approach was used to ensure a clear understanding of the organization's tasks and to get the employees committed to the developed organization design.

First, the Thesis started with the current state analysis involving more than 50 people from several different functions of EDG Services and 4-stroke Engine Services. The current state analysis pointed out that the designers of EDG Services had 15 different expectations towards the newly established PTM organization. Second, the findings were used to guide the literature search and create the conceptual framework which relied on the existing knowledge and best practices to organize to design the newly established PTM organization. The conceptual framework consisted of such elements of the organization design as *the processes, functions, roles, responsibilities* and *hierarchical structure.* Based on the results from the current state analysis as well as the best practice and available knowledge, the study suggested the proposal for the organization design for the case organization.

Third, the development of the proposal involved all 17 employees from the newly established PTM organization. The proposal grounded the basis for the newly established

PTM organization by suggesting a clear and collectively co-created organization design, based on the definition of the organization's *processes, functions, roles* and *responsibilities*, and finally by defining *its organizational structure*. The developed proposal was presented for the Director of EDG Services. The feedback was incorporated to the developed proposal. The outcome of the last phase was nine processes, four sub-functions, 115 responsibilities assigned for the 16 different roles using RAS responsibility matrix. Finally, the hierarchical structure of the newly established PTM organization was laid out showing the target situation in the end of 2017.

The proposed organization design builds the "backbone" and outlines the "organs and muscles" for the newly established PTM organization. This is the firm constructional part of organization design. However, the part of the "tissue, blood and nerves" still needs a lot of work so that the people, "living organism", can function effectively for the EDG Services. As a result of the proposal, the employees who were confused about the organizational change can focus on creating the new competitive edge towards the customers. The Thesis created the organization design which ensures that every employee of Product & Technical Management organization knows her or his role in order to deliver strategy in co-operation with other functions.

7.2 Next Steps and Recommendations towards Implementation of the Proposal

Importantly, the outcome of the current state analysis shows that the newly established PTM organization has connections not only with the functions of EDG Services but for 38 different functions in total. Therefore, the next step is to design interfaces towards these organizations.

Figure 26 shows the organization design after this Thesis.

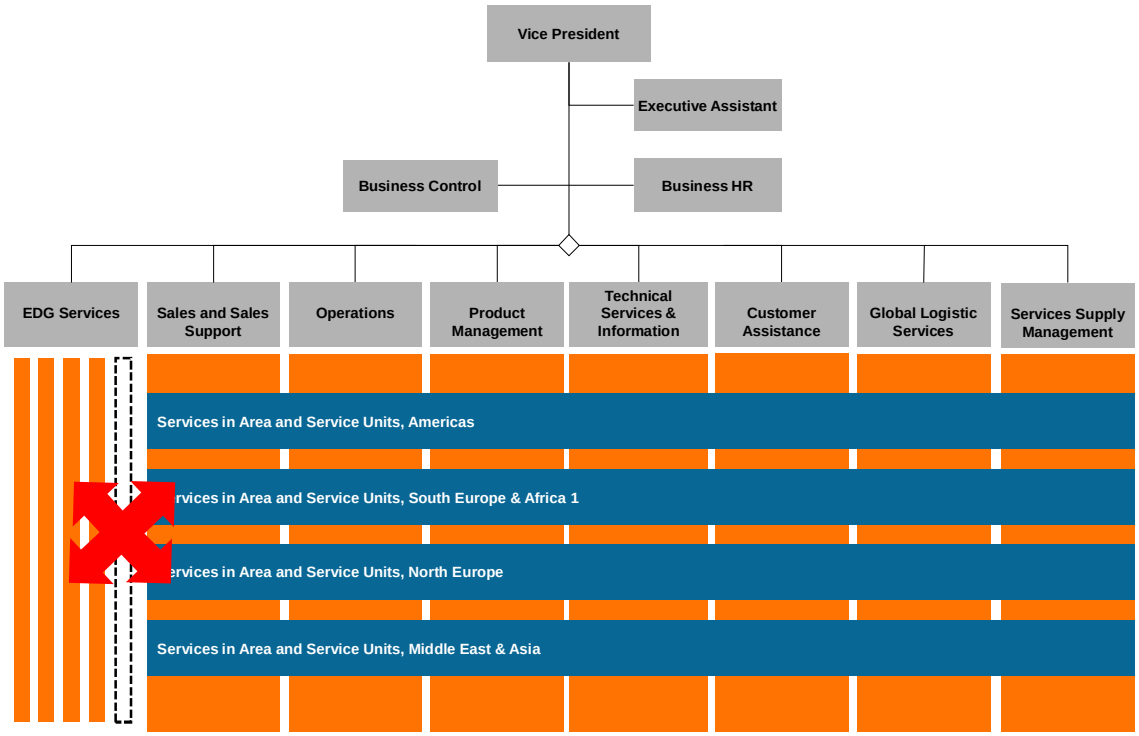


Figure 26. Interfaces in 4-stroke Engine Services (after this Thesis).

As seen from Figure 26 from the function (dashed line) indicates the newly established PTM organization in 4-stroke Engine Services. The red arrow indicates that all the directions are important for the newly established PTM organization. The organization design will be communicated to EDG Services and the planning of the next phase will be started.

The next phase is to follow-up that the created organization design solves as many current business challenges as possible. The current state analysis pointed out 15 different expectations towards interfaces and 89 different responsibilities or improvement areas which need to be solved in the next phase.

7.3 Thesis Evaluation

The objective of the Thesis, organization design, was widely defined in the beginning of the Thesis process but was narrowed down and firmly formulated into the objective for the Thesis, and eventually resulted in a similar outcome, as initially agreed. The current state analysis was extensive and lasted almost six months. During this time, many emerged business challenges had to be solved immediately. This led to the situation, in which some of the design options were excluded before the co-creation workshops. All the personal development discussions with the employees of the newly established PTM organization were also completed during the current state analysis which somewhat tied

the hands of the researcher. Moreover, two employees left and six employees were hired during the current state analysis. These need to be taken into account as additional dynamics of the research setting.

In action to the applied part, there are also significant research quality criteria that need to be into account in order to ensure quality for the Thesis, logic, relevance, validity and reliability is evaluated for the different stages of the Thesis.

7.3.1 Logic

Logic means that there is reasoning behind the thinking. The order of activities can be justified. In this Thesis, the logic was discussed in the beginning because it was not clear if the organization design needs improvement or if it exist at all. The logic in Sections 1 and 2 means that understanding of the *status quo* was completed as the first step and a foundation for all the other steps. The logic for Section 3, Section 4, and Section 5 lied the foundation to the co-creation with all the employees of the newly established PTM organization, who contributed in the group or individually, thus paving the justified and logical grounds for the organizational change.

7.3.2 Relevance

Relevance means that the studied issues are important to the case organization and firmly relate to the steps and scope of the Thesis. In this Thesis, the topic and the business challenge are relevant because findings of the current state analysis show lots of the expectations from designers of EDG Services.

The Thesis includes stages that are not equally relevant to contributing to the outcome. The interviews could have been limited to EDG Services (20 interviewees) and leave some of informants away (26 interviewees). Section 4, literature review, also discusses some practices, especially regarding the processes, which are not fully relevant to the proposed outcome but discussed as they will become more important for the next phases after this Thesis. The developed solution based on the conceptual framework is definitely relevant for the newly established PTM organization.

7.3.3 Validity

Validity means that there is proven evidence from the starting point till the end of the Thesis that the study is constructed using the valid tools and is based on valid data collection. In relation to the validity of the data, the two major aspects are data saturation and triangulation. Saturation in Section 3 is justified by means of a significant number of interviews and similarly, a significant number of documents reviewed. On the other hand, the utilization and importance of existing documents could have been improved. Hence, saturation requirements were fulfilled extensively in Section 3 but triangulation could be better if the interviews included more people from different functions of EDG Services.

In Sections 5 and 6, validity of the outcomes can be evaluated via degree of participation and the quality of narration. To ensure this type of validity, the researcher, first, reported to the participants well in advance before the next stage, the co-creation workshops, second, the information regarding the organization design was carefully shared to reach all involved parties, and third, all the employees had time to prepare their answers and to contribute in different ways.

7.3.4 Reliability

Reliability means that there are proven links between the findings, the interpretations and the research steps, so that if this path repeated, it will lead to a similar outcome. The reliability of this Thesis was ensured by taking detailed field notes. All the notes are reported in one Excel including very personal information and opinions from different interviewees. These field notes are made available in the Excel document (Appendix 1) and the relevant issues are summarized in Section 3. In some exceptional cases, also recording was used. The results show reliability since the responses are very much repeated by the informants. The research's bias was avoided as much as possible since the researcher did not have common working background with the interviewed employees, especially the leaders or Services division. What could have been done differently in the co-creation workshops is to not to mix people from different hierarchies in order to give more power for the employees on different levels of the hierarchical structure.

Similarly, the reliability of the validation in Section 6 includes could have been improved when reviewing the co-creation workshop material together with the supervisor of the researcher. The other 10 designers of EDG Services, or some of them, could also have

been involved at this stage. However, at the time of conducting the validation session, the validation could not be more practical because of time limitation. Next steps should tackle these possible drawbacks.

7.4 Closing Words

The study is important for all new and especially young managers in order to understand the building blocks of the organization. The organization design should be understood as all-encompassing term. Thesis highlights the importance of two aspects:

First, the organization design is much more than the organization chart which is changed time to time. While scholars have created different kinds of conceptual frameworks, they all include the term structure. The organization chart is part of the structure, hence the building block of the organization design. Hence, the Thesis ignites the discussion if the organizational changes takes place in the correct building blocks of the organization design.

Second, the Thesis introduces a conceptual framework of organizational change for functional departments. This conceptual framework can be used to evaluate the ongoing organization change towards to desired functional organization.

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Appendix 1.
Data collection 1 and 3 (interviews and summaries of the field notes)

Interview preparation

To get familiar with the current status in the newly established PTM organization, a series of interviews with the key identified employees was conducted. It also helped the researcher to get familiar with terminology and products.

The following meeting invitations were sent out for interviews including the following text (Internal documentation: Product & Technical Management for EDG Services interview invitation.pdf):

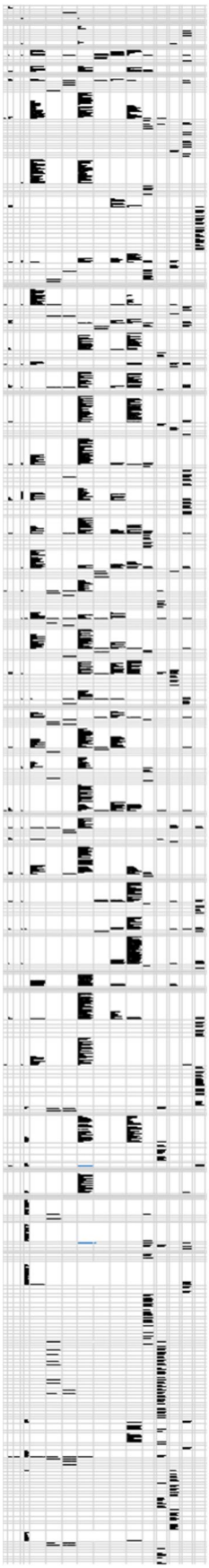
> *Please be invited to the discussion regarding EDG product and technical activities in the case company Services. I have been appointed to position of General Manager, PTM, EDG Services starting from 1st November 2016. The purpose of this discussion is to clarify current status of activities in the case company Services. The agenda is as follows: your role, key functions, key processes, key interfaces, challenges and strengths.*

The summary of the filed notes from the interviews, meetings and workshops for Data collection 1 are presented below.

Recordings:

Name	Date	Type	Size	Length
Data 1 PTM interview - 14 November 2016 09.58.37.mp4	14.11.2016 10:...	MP4 Video	853 068 KB	02:18:40
Data 1 PTM interview - 15 November 2016 10.58.13.mp4	15.11.2016 11:...	MP4 Video	496 980 KB	01:45:56
Data 1 meeting WFR TS EDG hand over preparation - 7 December 2016 11.06.31.mp4	7.12.2016 15:16	MP4 Video	254 908 KB	00:49:38
Data 1 meeting Technical Identification for ENGINE 1 - 14 December 2016 10.32.45....	14.12.2016 10:...	MP4 Video	159 914 KB	01:00:17
Data 1 PTM interview - 10 January 2017 14.02.14.mp4	10.1.2017 14:05	MP4 Video	66 924 KB	00:50:36
Data 1 PTM interview - 10 February 2017 10.01.49.mp4	10.2.2017 10:04	MP4 Video	249 868 KB	00:53:01
Data 1 PTM interview - 13 February 2017 10.00.12.mp4	13.2.2017 10:03	MP4 Video	270 065 KB	00:58:48
Data 1 PTM interview - 13 February 2017 12.29.42.mp4	13.2.2017 12:32	MP4 Video	10 292 KB	00:12:19
Data 1 PTM interview - 13 February 2017 12.58.48.mp4	13.2.2017 13:01	MP4 Video	177 339 KB	00:42:05
Data 1 PTM interview - 14 February 2017 10.35.25.mp4	14.2.2017 10:38	MP4 Video	226 864 KB	00:49:26
Data 1 PTM interview - 14 February 2017 16.14.18.mp4	14.2.2017 16:17	MP4 Video	264 208 KB	00:53:02
Data 2 Organization Design workshop 21 April 2017.m4a	21.4.2017 13:00	MPEG-4 Audio	159 469 KB	02:48:17
Data 2 Organization Design workshop 24 April 2017.mp4	24.4.2017 13:44	MP4 Video	814 532 KB	02:29:42
Data 3 General Manager - Director 2 May 2017 17.28.00.mp4	2.5.2017 18:24	MP4 Video	368 671 KB	01:05:07

Excel: (395 rows * 22 columns):



Appendix 2.

Data collection 2 (all responsibilities in nine processes)

Bulletins

Key Process CSA	Key Process Solution	#	Responsibilities	Technical Manager	Engine Expert Location A	Engine Expert Location B	Senior Design Engineer	Design Engineer	Design Engineer new	Assistant	Product Manager ENGINE 1	Senior Material Expert	Senior Technical Superintendent	Design Engineer, External	Chief Design Engineer, External	Product Engineer, External	Product Engineer, Technology, Marine Solutions	Product Manager ENGINE 4/ENGINE3 /ENGINE 2/AUX	GM, PTM	OTHER PTM (Create a new postion)	OTHER FUNCTION (EDG Services)
Technical Information	Bulletins	1	Create design change management documents (FMN) for ENGINE 1	S	S						R		S								
Technical Information	Bulletins	2	Approve content of change management documents (FMN) to be communicated for EDG customers	R	R						S		R						A		
Technical Information	Bulletins	3	Create Bulletins for ENGINE 7, ENGINE 8, ENGINE 1	S	S	S				R	S		S								
Technical Information	Bulletins	4	Approve content of Bulletins to be communicated for EDG customers	S	S	S					S		S						R		
Technical Information	Bulletins	5	Send Bulletins to Account Managers							R											

General

Key Process CSA	Key Process Solution	#	Responsibilities	Technical Manager	Engine Expert Location A	Engine Expert Location B	Senior Design Engineer	Design Engineer	Design Engineer new	Assistant	Product Manager ENGINE 1	Senior Material Expert	Senior Technical Superintendent	Design Engineer, External	Chief Design Engineer, External	Product Engineer, External	Product Engineer, Technology, Marine Solutions	Product Manager ENGINE 4/ENGINE 3/ENGINE 2/AUX	GM, PTM	OTHER PTM (Create a new position)	OTHER FUNCTION (EDG Services)
Technical Information	General	1	Distribute Technical Request	R																	
Technical Information	General	2	Give support for users of SAP (Key user)						R											R	R
Technical Information	General	3	Prioritize between customers																A		A
Technical Services	General	4	Call seminar to share information regarding welds, investigations etc.									R									
Technical Services	General	5	Give support for users of Apollo Root Cause Analysis tool (Key user)	R																	
Technical Services	General	6	Give support for users of Technical Request tool (Key user)										R								
Technical Services	General	7	Prioritize between Root Cause Analysis, Technical Request and Sales Support								S							S	R		A
General	General	8	Approve travel reports	R			R												R	A	
General	General	9	Approve travel requests	R			R												R	A	
General	General	10	Approve vacation requests	R			R												R	A	
General	General	11	Call monthly meeting for PTM																R	A	
General	General	12	Call weekly or bi- weekly meeting between Location A and Location B																R		
General	General	13	Communicate instructions for working hours reporting							R											
General	General	14	Coordinate travelling in EDG Services							R											
General	General	15	Coordinate vacation requests in PTM							R											
General	General	16	Create and up-date processes descriptions								S							S	S	R	
General	General	17	Create differend kind of customers specific letters	R	S	S					S		S					S			
General	General	18	Create monthly report for EDG Services management team	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	R	R	
General	General	19	Develop and maintain key competence of the team	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	R		
General	General	20	Ensure working hours reporting in SAP	R	R	R	R	R	R	A	R	R	R	R	R	R	R	R			
General	General	21	Participate to customer and authority audits	R	R		R				R							R	R	A	
General	General	22	Participate to EDG Services Quality Forum								S							S	R	A	
General	General	23	Report quality defects (10 CRF Part 21)	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		A	
General	General	24	Up-load documents to PTM server and distribute them							R											

Manuals

Key Process CSA	Key Process Solution	#	Responsibilities	Technical Manager	Engine Expert Location A	Engine Expert Location B	Senior Design Engineer	Design Engineer	Design Engineer new	Assistant	Product Manager ENGINE 1	Senior Material Expert	Senior Technical Superintendent	Design Engineer, External	Chief Design Engineer, External	Product Engineer, External	Product Engineer, Technology, Marine Solutions	Product Manager ENGINE 4/ENGINE 3/ENGINE 2/AUX	GM, PTM	OTHER PTM (Create a new position)	OTHER FUNCTION (EDG Services)
Technical Information	Manuals	1	Guide implementation EDG Services spare part strategy	S	S						R		S					R	S		
Technical Information	Manuals	2	Define list of spare parts to be delivered with supplier taking into account profit, delivery time and cost		S						R		S					R	S		
Technical Information	Manuals	3	Ensure that maintenance schedule match to available spare parts and work instructions		R								R	S	S	R	R				
Technical Information	Manuals	4	Ensure that the documented information is correct in terms of content, quality and functionality		R								R	S	S	R	R				
Technical Information	Manuals	5	Up-date Operation and Maintenance Manuals	S	R					S	A		R			S	S	A			
Technical Information	Manuals	6	Up-date Spare Part Catalogue	S	R					S	A		R			S	S	A			

Product Strategy and Road Map

Key Process CSA	Key Process Solution	#	Responsibilities	Technical Manager	Engine Expert Location A	Engine Expert Location B	Senior Design Engineer	Design Engineer	Design Engineer new	Assistant	Product Manager ENGINE 1	Senior Material Expert	Senior Technical Superintendent	Design Engineer, External	Chief Design Engineer, External	Product Engineer, External	Product Engineer, Technology, Marine Solutions	Product Manager ENGINE 4/ENGINE 3/ENGINE 2/AUX	GM, PTM	OTHER PTM (Create a new position)	OTHER FUNCTION (EDG Services)
Product Management	Product Strategy and Road Map	1	Create a product roadmap	S	S	S					R		S			S	S	R	S		A
Product Management	Product Strategy and Road Map	2	Develop, maintain and communicate the long term strategy for own products	S	S	S					R		S			S	S	R	S		A
Product Management	Product Strategy and Road Map	3	Participate in feasibility studies and relevant market analysis for own product								R							R	A		A
Product Management	Product Strategy and Road Map	4	Prioritize with Sales Management (identify customer needs: annual overhauls, out takes)								R							R	S		A
Product Management	Product Strategy and Road Map	5	Define Spare Part strategy		S	S					R		S			S	S	R	S		A
Product Management	Product Strategy and Road Map	6	Define Spare Part Catalogue strategy		S	S					R		S			S	S	R	A		
Product Management	Product Strategy and Road Map	7	Define Spare Part prices for different EDG customers																S		R
Product Management	Product Strategy and Road Map	8	Ensure that product master data is suitable for an existing sales tools and processes				S	S			R			S	S	S	S	R	A		S
Product Management	Product Strategy and Road Map	9	Develop and maintain obsolescence and Bulletins processes together with other product managers				S	S			R			S	S			R			
Product Management	Product Strategy and Road Map	10	Ensure sales support for ENGINE 4, ENGINE 2, ENGINE 3 and auxiliary components								S		S			S	S	R	A		
Product Management	Product Strategy and Road Map	11	Improve continuously product management processes and tools of Shared Business Operations for global EDG Services organization	S	S	S	S	S		S	S	S	S	S	S	S	S	S	R		
Product Management	Product Strategy and Road Map	12	Maintain or improve the commercial performance of own products								R							R	S		S
Product Management	Product Strategy and Road Map	13	Manage customer specific requirements in Polarion															R			
Product Management	Product Strategy and Road Map	14	Ensure communication with Customer Assistance Centre, Technical Services, Technical Information, Product Management and Pricing of 4-								R							R			
Product Management	Product Strategy and Road Map	15	Clarify EDG requirements in own responsibility area for 4-stroke Engine Services								R							R	S		R
Product Management	Product Strategy and Road Map	16	Communicate business opportunities over EDG Services organization (profitability, internal selling)								S							S	S		R
Product Management	Product Strategy and Road Map	17	Communicate business opportunities over 4-stroke Engines (profitability, internal selling)								R							R	S		S
Product Management	Product Strategy and Road Map	18	Act as product spokesperson in relevant internal, cross-divisional and external forums								R							R			
Product Management	Product Strategy and Road Map	19	Participate in technical and commercial meetings with customers	S	S	S					R		S			S	S	R	S		

Root Cause Analysis

Key Process CSA	Key Process Solution	#	Responsibilities	Technical Manager	Engine Expert Location A	Engine Expert Location B	Senior Design Engineer	Design Engineer	Design Engineer new	Assistant	Product Manager ENGINE 1	Senior Material Expert	Senior Technical Superintendent	Design Engineer, External	Chief Design Engineer, External	Product Engineer, External	Product Engineer, Technology, Marine Solutions	Product Manager ENGINE 4/ENGINE 3/ENGINE 2/AUX	GM, PTM	OTHER PTM (Create a new postion)	OTHER FUNCTION (EDG Services)
Technical Services	Root Cause Analysis	1	Communicate with Operations Management EDG	R	R	R							R						A		
Technical Services	Root Cause Analysis	2	Prioritize between non EDG Root Cause Analysis and EDG Root Cause Analysis		S	S							S						R	A	
Technical Services	Root Cause Analysis	3	Ensure availability of experts from Finland to participate to Root Cause Analysis								S							S	R		
Technical Services	Root Cause Analysis	4	Ensure communication over all investigation laboratories									R									
Technical Services	Root Cause Analysis	5	Prioritize between non EDG investigations and EDG investigations									S							R	A	
Technical Services	Root Cause Analysis	6	Perform material investigations									R									
Technical Services	Root Cause Analysis	7	Perform Root Cause Analysis	R	R	R						S	R								

Spare Part Bill of Materials

Key Process CSA	Key Process Solution	#	Responsibilities	Technical Manager	Engine Expert Location A	Engine Expert Location B	Senior Design Engineer	Design Engineer	Design Engineer new	Assistant	Product Manager ENGINE 1	Senior Material Expert	Senior Technical Superintendent	Design Engineer, External	Chief Design Engineer, External	Product Engineer, External	Product Engineer, Technology, Marine Solutions	Product Manager ENGINE 4/ENGINE 3/ENGINE 2/AUX	GM, PTM	OTHER PTM (Create a new postion)	OTHER FUNCTION (EDG Services)
Technical Information	Spare Part Bill of Materials	1	Ensure that Services get project related documents from Energy Solutions															R			
Technical Information	Spare Part Bill of Materials	2	Ensure that Services get project related documents from Operation Management EDG															R			
Technical Information	Spare Part Bill of Materials	3	Create drawings in I-deas		S	S		R	R			S	S								
Technical Information	Spare Part Bill of Materials	4	Create drawings in Medusa		S	S	R					S	S								
Technical Information	Spare Part Bill of Materials	5	Create drawings in Pro Engineer		S	S	R		R			S	S								
Technical Information	Spare Part Bill of Materials	6	Create indirect purchasing material numbers in SAP																		R
Technical Information	Spare Part Bill of Materials	7	Create EDG material numbers in SAP		S	S		R	R			S	S								
Technical Information	Spare Part Bill of Materials	8	Create EDG material numbers in Teamcenter											R	R	R	R				
Technical Information	Spare Part Bill of Materials	9	Prioritize Technical Requests				R														
Technical Information	Spare Part Bill of Materials	10	Revise EDG material numbers in SAP		S	S		R	R			S	S								R

Spare Part Bill of Materials AUX

Key Process CSA	Key Process Solution	#	Responsibilities	Technical Manager	Engine Expert Location A	Engine Expert Location B	Senior Design Engineer	Design Engineer	Design Engineer new	Assistant	Product Manager ENGINE 1	Senior Material Expert	Senior Technical Superintendent	Design Engineer, External	Chief Design Engineer, External	Product Engineer, External	Product Engineer, Technology, Marine Solutions	Product Manager ENGINE 4/ENGINE 3/ENGINE 2/AUX	GM, PTM	OTHER PTM (Create a new position)	OTHER FUNCTION (EDG Services)
Product Management	Spare Part Bill of Materials AUX	1	Ensure smooth communication between divisions and engineering partners											S	S	S	S	R	A		
Technical Information	Spare Part Bill of Materials AUX	2	Ensure smooth communication with suppliers and 4-stroke Engine Services											R	R	R	R	S	A		
Technical Information	Spare Part Bill of Materials AUX	3	Ensure involvement of Services people (Energy Solutions contract)															R	A		
Technical Information	Spare Part Bill of Materials AUX	4	Plan, schedule, manage cost and report status for creation of drawings and specification											S	S	S	S	R	A		
Technical Information	Spare Part Bill of Materials AUX	5	Establish monthly status report (Energy Solutions contract)															R	A		
Product Management	Spare Part Bill of Materials AUX	6	Lead auxiliary team which implement to EDG Services spare part strategy															R	A		
Technical Information	Spare Part Bill of Materials AUX	7	Collect technical information including 3D models, drawings and specifications about auxiliary components											R	S	S	S		A		
Technical Information	Spare Part Bill of Materials AUX	8	Collect technical requirements and translate them into specifications											S	S	R	R		A		
Technical Information	Spare Part Bill of Materials AUX	9	Coordinate documentation work with engineering partner												R				A		
Technical Information	Spare Part Bill of Materials AUX	10	Create and up-date supplier specific Balance of Plant Excel											R	R	R	R	S	A		
Technical Information	Spare Part Bill of Materials AUX	11	Ensure that Documentation Engineers and Design Engineers follow general international standards and the case company guidelines and												R				A		
Technical Information	Spare Part Bill of Materials AUX	12	Ensure that EDG quality requirements are connected to specification and drawings													R	R		A		
Technical Information	Spare Part Bill of Materials AUX	13	Ensure that technical requirements are collected and translated into specifications and drawings													R	R		A		
Technical Information	Spare Part Bill of Materials AUX	14	Follow and control budget for work to be done for Spare parts (Energy Solutions contract)															R	A		
Technical Information	Spare Part Bill of Materials AUX	15	Follow and control budget Spare Parts (Energy Solutions contract)															R	A		
Technical Information	Spare Part Bill of Materials AUX	16	Follow and control schedule for Spare Parts (Energy Solutions contract)															R	A		
Technical Information	Spare Part Bill of Materials AUX	17	Follow general international standards and the case company guidelines and standards											R					A		
Technical Information	Spare Part Bill of Materials AUX	18	Maintain qualification together with EDG Services Quality Management													R	R		A		
Technical Information	Spare Part Bill of Materials AUX	19	Mentor and training on job to Documentation Engineer and Design Engineer												R				A		
Technical Information	Spare Part Bill of Materials AUX	20	Create material numbers for spare parts and spare part kits											R					A		
Technical Information	Spare Part Bill of Materials AUX	21	Check engine components (master data, 3D, 2D drawings and other specifications)												R				A		
Technical Information	Spare Part Bill of Materials AUX	22	Approve engine components (master data, 3D, 2D drawings and other specifications)													R	R		A		

Technical Identification

Key Process CSA	Key Process Solution	#	Responsibilities	Technical Manager	Engine Expert Location A	Engine Expert Location B	Senior Design Engineer	Design Engineer	Design Engineer new	Assistant	Product Manager ENGINE 1	Senior Material Expert	Senior Technical Superintendent	Design Engineer, External	Chief Design Engineer, External	Product Engineer, External	Product Engineer, Technology, Marine Solutions	Product Manager ENGINE 4/ENGINE 3/ENGINE 2/AUX	GM, PTM	OTHER PTM (Create a new position)	OTHER FUNCTION (EDG Services)
Technical Information	Technical Identification	1	Perform Technical Identification																		R

Technical Support

Key Process CSA	Key Process Solution	#	Responsibilities	Technical Manager	Engine Expert Location A	Engine Expert Location B	Senior Design Engineer	Design Engineer	Design Engineer new	Assistant	Product Manager ENGINE 1	Senior Material Expert	Senior Technical Superintendent	Design Engineer, External	Chief Design Engineer, External	Product Engineer, External	Product Engineer, Technology, Marine Solutions	Product Manager ENGINE 4/ENGINE 3/ENGINE 2/AUX	GM, PTM	OTHER PTM (Create a new position)	OTHER FUNCTION (EDG Services)
Technical Services	Technical Support	1	Approve Inspection Quality Plan with Hold Points & Withness Points	R																	
Technical Services	Technical Support	2	Communicate EDG electrical and automation Obsolecence Management issues with Technical Service 4-stroke Engine Services								S		R					S			
Technical Services	Technical Support	3	Create welding book and welding procedure for Surgeres workshop									R									
Technical Services	Technical Support	4	Ensure expert support from Finland (Marine Solutions, Energy Solutions, Services)																R		
Technical Services	Technical Support	5	Participate to customer feedback meeting								R							R	S		A
Technical Services	Technical Support	6	Prioritize Technical Requests		R								R								A
Technical Services	Technical Support	7	Prioritize Technical Support between for non EDG engines and EDG engines		R								R								A
Technical Services	Technical Support	8	Prioritize Technical Support requests between dismantling, sub-assembly, assembly, FAT, Life Cycle Support, Project Management and			R															A
Technical Services	Technical Support	9	Technical Support for Bulletins	R	R	R							R								
Technical Services	Technical Support	10	Technical Support for FMN	R	R	R			R				R								
Technical Services	Technical Support	11	Technical Support for Commercial Grade Dedication	R	R								R								
Technical Services	Technical Support	12	Technical Support for electrical and automation of ENGINE 4										R								
Technical Services	Technical Support	13	Technical Support for Field Service and customers	R	R	R							R								
Technical Services	Technical Support	14	Technical Support for Life Cycle Support	R	R	R							R								
Technical Services	Technical Support	15	Technical Support for selling of auxiliary components		R								R			S	S	S			
Technical Services	Technical Support	16	Technical Support for Service Unit France		R								R								
Technical Services	Technical Support	17	Technical Support for Location B factory	S	S	R							S								
Technical Services	Technical Support	18	Technical Support for Technical Identification		R								R								
Technical Services	Technical Support	19	Technical Support for validation of new suppliers		R	R							R								
Technical Services	Technical Support	20	Technical Support for electrical and automation of ENGINE 5/ENGINE 6										R								
Technical Services	Technical Support	21	Technical Support to supplier's questions origin from Purchase Order		R								R								