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Developing a Quality Management Framework for a Knowledge Intensive Company

Quality Management Framework to Support the Ongoing Product Development Relocations

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PREFACE

This study was conducted at Helsinki Metropolia University of Applied Sciences. The topic of the study is an approach for supporting the product development relocation to its new location.

The Master's program in Industrial Management has been a very fruitful experience for my professional career. Even it has been extensive and intensive journey at times, it has also been rewarding learning curve. I would like to thank all the instructors and classmates for making this journey interesting.

I would like to give big thanks to my supervisors DSc (Tech), Principal Lecturer Marjatta Huhta and DSc (Econ) Thomas Rohweder whose structured feedback and valuable comments were tremendous support for me. I also want to express special thanks to PhL, Senior Lecturer Zinaida Grabovskaia whose dedication and resilience to support me made it possible to have the study finalized.

I also thank my employer who granted me with much needed flexibility between work and study during this journey. I thank all the interviewees in the company as well, for making the time for the interviews and feedback.

I want to give my warmest appreciation to my dear family for their patience and support during my studies.

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ABSTRACT

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This Master's Thesis focuses on providing quality management support to the Product Development (PD) relocation in the case company. The PD relocation motivation is based on a need to free up people for new product development in Country A and aims at cost savings without ultimately compromising the quality of the relocated product.

To address this challenge, the objective of the study is to propose a Quality Management Framework (QMF) to support the ongoing PD relocation from Country A to Country B. The study uses action research as its research approach. In order to achieve this objective, the study explores and analyzes the challenges revealed in the current PD relocation process and explores the existing best practice and available knowledge from the literature to suggest a possible QM framework. The data collection in the study includes interviews and discussions with the stakeholders in the PD relocation, observations and review internal documentation from both sides of the PD relocation in the case company.

This approach leads to the initial proposal of QMF which is presented to the stakeholders of the ongoing PD relocation. Based on the feedback, the finalized proposal for the Quality Management Framework is presented consisting of a) Proactive Guide for PD relocation, b) Checklist, and c) Evaluation. This QM Framework is later extended with recommendations for the Release Areas in the ongoing PD relocation.

The outcome of the study is thus a QM Framework which suggests proactive practices and QM support to the case company in the ongoing PD relocation. This will improve and mitigate the PD relocation experience in the case company which can be seen as increased relocations achievements and stability of product quality when it is relocated to the receiving side.

Keywords	Offshoring, relocation, product development relocation, PD relocation, PMBOK, Quality, Quality Management Framework

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Abbreviations

CPP – Connectivity Packet Platform

CSR – Customer Service Request

QMF – Quality Management Framework

HW – Hardware

IMS – IP Multimedia Subsystem

ISO – International Organization of Standardization

M-MGw - Mobile Media Gateway

MRS – Media Resource System

MSC – Mobile Switching Centre

PD – Product Development

RA – Release Area

R&D - Research and Development

SW – Software

1 Introduction

Offshoring/outsourcing is used by companies for relocating various operations in global context. Companies search for strategic advantage, achieving major cost savings and also for access to the talent and skills of foreign countries. Relocation can encompass manufacturing and service-based deliveries, as well as product Research and Development (R&D) and maintenance. Though being practiced a lot over the last decades, relocations represent complex projects, with many companies experiencing challenges either during the process or in the results of relocation. One of the ways to help in relocations could be by securing quality during the relocations. Quality management can provide the strategy to ensure the continuum of business critical activities. Thus, it may serve as the means to enhance the organisational performance and managing the risks during the relocations.

This study focuses on relocating one product development project functions between the countries within the case company. As product development is highly competence intensive, the challenge lies in suggesting a solution for relocating without compromising the quality of this product development. This solution points to developing the quality management process as a way to keep quality in control in the product development relocation. Thus, the quality management process is considered as the focus of this study.

1.1 Key Concepts of the Study

Quality is typically considered as a measure of the state which distinguishes a characteristic of an object as being on higher calibre than other objects. Therefore quality should be build up knowingly and by staging through suitable processes, procedures, resource responsibilities and appropriate organization structure (Naidu 2006: 70). From a more practical point of view, quality is simply considered as meeting the customer requirements (Oakland 1995: 4). Quality could also mean that the product performs within the time defined based in its specifications. Therefore, quality typically encompasses a wide range of characteristics which makes it a complex phenomenon.

In this study, *quality* refers to certain features of the product and product development (PD) which should stay on the same level after the product relocation. *Product development* refers to the end-to-end process of designing and testing hardware (HW) and software (SW) components of the product. *Relocation* in this study refers to the transi-

tion of the main responsibilities, functions and the content of product development responsibility to another branch within the case company which is located offshore.

1.2 Case Company

The case company of this study is a multinational mobile telecom company. It operates in various countries worldwide. The case company is also a major telecom equipment manufacturer of network equipment and SW, as well as a service provider for network and business operations (Company facts: 2015). The case company customers are telecom operators who provide voice, messaging and data services to their end- users globally. The case company delivers high quality products and solutions to its customers and for end users, supported by world class development process (Case Company Quality Network 2015). The case company generates a substantial margin of its revenues from a product, equipment and SW products designed for the telecom markets. These all are currently relocated to another branch in the company.

For the case company, the end-user experience, quality of the product and proven track record on product performance plays a key role for keeping a leading position in the telecom markets. Therefore, the company is especially concerned with the customer experience and quality of its products, in any areas where they are produced.

1.3 Business Challenge

Recently, the case company has started implementing a transformation strategy in order to keep competitive in the current ICT industry (Case Company, Annual Report 2014). As a result, the Finnish subsidiary of the case company is involved in relocating one of the products to a lower cost country. The motivation to relocate is based on the need to free up people for new product development in the origin country and to reach cost savings. This is planned to be achieved by utilizing the knowledge and best practice available in the home company *(the Sending side)*. The idea is that *the Receiving side* of the relocation will take full responsibility of the relocated product activities. By now, this product has been developed and maintained in the home country for a long period of time, and it is known for its superior quality, performance and availability.

The case company target is to ensure quality during and after the relocation of this business critical product development. Before the start of relocation, it was the Finnish subsidiary that had the main responsibility for developing and maintaining the relocated

product. The relocated product has now reached the end part of its product development life cycle but it is still highly used in the industry.

The relocated product encompasses a substantial amount of equipment, which means that its quality is invaluable and should not be compromised during the relocation. Therefore, the planning and executing of the relocation activities need to be made extremely carefully, keeping the focus on the quality of the product so that it is not decreasing during the relocation operation. Also the product delivery and release cycle should be kept on the same quality level as it was prior to the relocation.

The company plans to measure quality of the actual product as soon as the PD relocation has been completed. The risk, however, is that at that stage, the quality of the product will be too late to correct. Therefore, the case company chooses to react proactively, *prior and during* the product development relocation, before the product releases are shipped to telecom customers by the receiving side (Hungary).

1.4 Objective and Intended Outcome

The goal of this study is to propose a Quality Management Framework to support the ongoing PD relocations proactively in the relocation to its new location. The proposal should include the steps for keeping up the current quality of PD, when it is being relocated, and suggest indicators to evaluate the level of quality of PD when it is relocated. It leads to formulation of the following objective for the study:

> To propose a Quality Management Framework to support the ongoing PD in the relocation from Country A to Country B.

The outcome of the study is thus a Quality management framework that could help approach and evaluate the quality of the operations in the PD during the relocation (at certain particular moments) and their acceptable level.

This study is divided into seven sections. Section 1 gives an overview of the study. Section 2 describes the research approach, design, data collection and methods used in this study. Section 3 presents the results of the current state analysis of the PD relocation project and quality management in the case company. Section 4 presents the conceptual framework of this study for keeping quality in product relocations in general. Section 5 discusses suggestion for the quality management for the current product

development relocation, based on the interviews with the key stakeholders. It formulates the initial proposal for the QM framework how to approach quality in relocations in the case company. Section 6 discusses the results of feedback and validation of this proposal with key stakeholders. It also incorporates the recommendations and improvements from feedback to the final proposal. Finally, Section 7 contains the summary of this study and discusses the practical implications that this study has generated. It also reflects on the outcome vs. the objective and discusses the reliability and validity of the results.

2 Method and Material

This section describes the research approach and research design of this study. Additionally, the data collection and analysis methods are presented. Finally, the reliability and validity plan is described.

2.1 Research Approach

Action research is selected for this study as its research approach. Action research is a scientific approach to study and resolve important social and organizational issues together with those who experience these issues directly (Coghlan and Brannick 2014: 6). Action research makes a combination of background research and specific focused research. Some theorists believe that action research is also an overarching research culture or paradigm that can work with almost any primary methods, depending on the situation and context of the research problem (Hearn and Foth 2005:8).

Action research aims to be a systematic process and a way to provide practical outcomes. It starts from effectively enabling distinct phases from diagnostic phase, where the scope of the research is identified and defined. Figure 1 presents Action Research as a cyclical process.

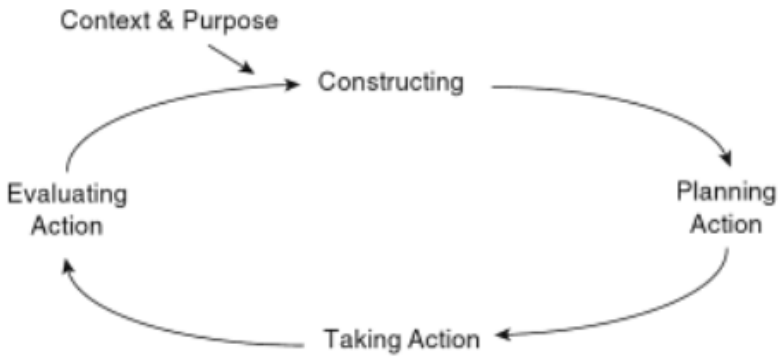

Figure 1. Action Research Cycle (Coghlan and Brannick 2014:9)

Figure 1 shows the phases of action research cycle. The action research cycle starts with identifying the context, purpose and potential of the research project. In this step, the ownership of the context is also identified for which the collaborative relationship is established. In the second phase, a constructive dialogue is started with the key stakeholders for identifying which basis and practicalities will be taken in the research. In this stage, the planning of action phase specifies the actions that should improve the primary problems identified in the construction phase in the research. The action plan also

establishes the target and the approach for the research. Next, the action taking phase implements the planned action. In this phase, the collaborative relationship intervention with the key stakeholders can cause certain changes to the research project. In the evaluating action phase, the results and outcomes of the taken action are evaluated (Coghlan and Brannick 2014:10). The effects of the taken action will demonstrate whether the results and outcomes were successful or not.

Due to these specific features, Action Research is chosen as a research approach for this study. Additionally, the author of this study is an employee of the case company and has a purpose of bringing change to the organization. In this study, the primary target of the action research is to help the case company to make sense of the existing process and change the case company existing system. The second target is to improve and bring the desired change into existence. The third target is to solve real, practical problems related to the topic. The final, eventual target is to spread this solution to solve similar challenges in other units of the case company.

2.2 Research Design

In this study, the research design has the following logic. It starts by identifying the objective. Then it progresses to the phase where the themes, ideas and practices are searched from the literature and from available knowledge. Alongside the current state analysis conducted in the case company. Based on these findings, a prototype for initial proposal demonstration is designed. Finally, the results from the initial proposal are evaluated and the final version of the proposal is built.

Figure 2 illustrates the steps which are executed during the research in this study.

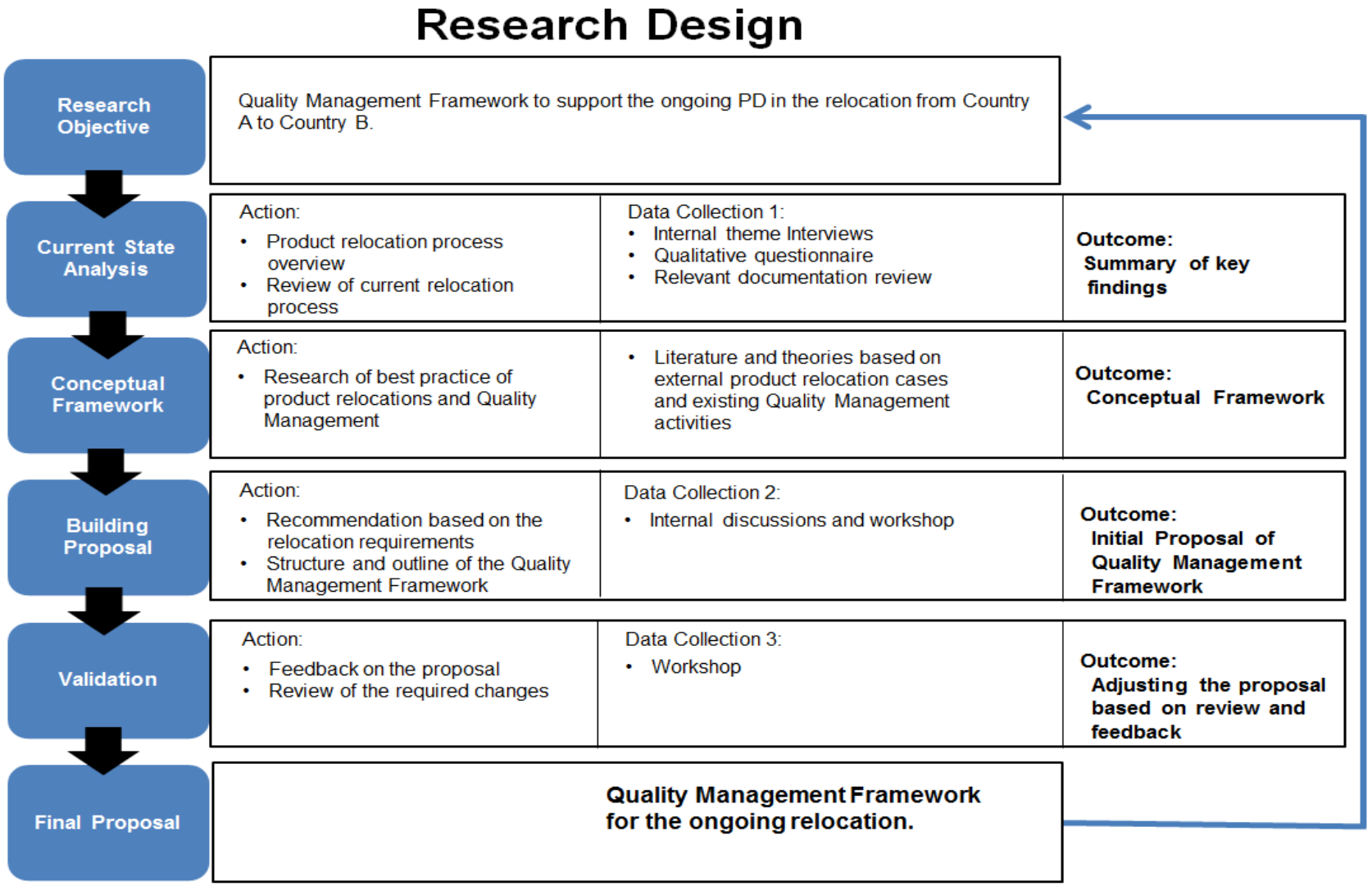

Figure 2. Research Design of this case study.

As seen in Figure 2, identification of the research objective makes the first step in this study. In this study, the initiative for this research came from the case company management. This step leads to formulation of a following research objective as developing a Quality Management Framework to support the ongoing PD relocations from Country A to Country B.

The second step consists of the current state analysis and data collection based on examination of the current state of the company procedure for the PD relocation. In the current case, there are areas for which the relocation is already concluded from Country A to Country B. These concluded cases are analysed as a point of reference to reflect and emphasize the strengths and weakness. The data collection is executed by collecting data from semi-structured interviews.

In the third step, the conceptual framework is based on the findings from the relevant literature, theory and search for best practice. The concepts and practices emerging from the literature are analysed and synthesised into a conceptual framework for the study. In the fourth step, the initial proposal is built collaboratively, based on the results from the current state analysis. During the fifth step, the proposal is validated by the case company management team and further development is pointed out. Finally, based on the given development feedback and suggestions, the final proposal is formulated.

2.3 Data Collection and Analysis Methods

In this study, mainly qualitative research methods were utilized for the data collection and analysis. The data collection was executed in three iterations (Data Collection 1, 2 and 3) by collecting data from semi-structured interviews, discussions and workshops with the stakeholders, observations and internal documentation. Each type of data is described in more detail below.

2.3.1 Research Interviews

Interviews conducted in this study involved thirteen stakeholders who have relevant roles in the process of PD relocation. The interviews were conducted based on the semi-structured interview questionnaire (Appendix 1), which, in this study, refers to a formal conversation which starts from setting a list of questions and topics to be covered in particular order during the interview. The semi-structured interview outlines the

direction and thus shapes the subsequent flow of the conversation. The aim for using such method was to get the interviewee's insight for the questions of interest.

The interviews were conducted in all three rounds of data collection, as shown in Tables 1, 2 and 3 below, according to the round of data collection.

Data collection 1

Table 1. Case company research interviews: Data collection 1.

#	Position in the company	Relocated Product Area	Documented	Date	Duration	Relevant discussion themes for the study
1.	1A.Product Owner I (FI)	Infrastructure & Tools	Recording, Field Notes	2.2015	1h	Relocation requirements, time line, communication, documentation, quality of the relocation, capability, knowledge relocation, Indicators
3.	2A.Product Owner II (HU)	MRS	Recording, Field Notes	2.2015	1h	Relocation requirements, time line, communication, documentation, quality of the relocation, capability, knowledge relocation, Indicators
3.	3A.Product Owner III (FI)	PLM	Recording, Field Notes	2.2015	1h	Relocation requirements, time line, communication, documentation, quality of the relocation, capability, knowledge relocation, Indicators
4.	4A.Senior Developer I (FI)	RA Upgrade & Expansions	Recording, Field Notes	2.2015	1h	Relocation requirements, time line, communication, documentation, quality of the relocation, capability, knowledge relocation, Indicators
5.	5A.Senior Developer II (FI)	RA Upgrade & Expansions	Recording, Field Notes	2.2015	1h	Relocation requirements, time line, communication, documentation, quality of the relocation, capability, knowledge relocation, Indicators
6.	6A.Lead Coach (HU)	Integrity Functions	Recording, Field Notes	12.2015	1h	Relocation requirements, time line, communication, documentation, quality of the relocation, capability, knowledge relocation, Indicators
7.	7A. Agile Coach (HU)	Packaging, OAM	Recording, Field Notes	3.2015	1h	Relocation requirements, time line, communication, documentation, quality of the relocation, capability, knowledge relocation, Indicators
8.	B1.Senior Project Manager (HU)	Release Management	Recording, Field Notes	2.2015	1h	Relocation requirements, time line, communication, documentation, quality of the relocation, capability, knowledge relocation, Indicators
9.	B2.Department Manager (FI)	Technology Management	Recording, Field Notes	2.2015	1h	Relocation requirements, time line, communication, documentation, quality of the relocation, capability, knowledge relocation, Indicators
10.	B3.Program Manager (FI)	Release Management	Recording, Field Notes	2.2015	1h	Relocation requirements, time line, communication, documentation, quality of the relocation, capability, knowledge relocation, Indicators
11.	B4.Section Manager (HU)	Release Management	Recording, Field Notes	2.2015	1h	Relocation requirements, time line, communication, documentation, quality of the relocation, capability, knowledge relocation, Indicators
12.	B5.Release Manager (HU)	Functional Development	Recording, Field Notes	2.2015	1h	Relocation requirements, time line, communication, documentation, quality of the relocation, capability, knowledge relocation, Indicators
13.	B6. Section Manager, Quality (HU)	Integrity Functions	Recording, Field Notes	3.2015	1h	Relocation requirements, time line, communication, documentation, quality of the relocation, capability, knowledge relocation, Indicators

The interview details listed in Table 1 show the company personnel interviewed for this study. The interviewees comprised representatives from both side of the PD relocation. Data 1 was used to collect the data for mapping the current state of the product development responsibility (as it is in the sending side) and to give insights of the skills and competence required for keeping quality in the PD relocation. Interviews comprised informants from two different levels: (a) product technical staff members as well as (b) managerial members. The analysis of results was done using the Content analysis method.

In addition, the author of this thesis interviewed three examples Release Areas (RA) which had already relocated their PD to receiving side. Table 2 below presents the conducted interviews.

Table 2. Case company interviews of relocated PD RA's: Data collection 1.

#	Position in the company	Documented	Date	Duration	Relevant discussion themes for the study
1.	A. Team Coach (HU)	Recording, Field Notes	10.2015	1h	Product relocation actions, tools/metrics, social ties and their delta
2.	B. Experienced Software Developer (HU)	Recording, Field Notes	10.2015	1h	Product relocation actions, tools/metrics, social ties and their delta
3.	C. Senior Developer I (FI)	Recording, Field Notes	10.2015	1h	Product relocation actions, tools/metrics, social ties and their delta
4.	D. Senior Developer II (FI)	Recording, Field Notes	10.2015	1h	Product relocation actions, tools/metrics, social ties and their delta
5.	E. Senior Developer III (FI)	Recording, Field Notes	10.2015	1h	Product relocation actions, tools/metrics, social ties and their delta

Table 2 presents the employees connected to the current PD relocation from three Release areas who had already relocated their PD responsibility to the receiving side. The interviews were done in individually or in group meetings, and supported by the questionnaire. The interviewees were invited to the interview by email and the questionnaire was attached to the invitation. By this way the interviewee could get familiar to the questions in advance. At the beginning of the interview, the interviewee received a short introduction of the purpose, reason and background of the interview. The languages used in the interviews were Finnish and English. All interviews were recorded and field notes were taken.

Data collection 2

The goal here was to get suggestions from the relevant stakeholders for securing quality in PD relocation. The company stakeholders interviewed for this study comprised representatives from both side of the PD relocation, as shown in Table 3 below.

Table 3. Building the Proposal: Data collection 2.

#	Position in the company	Documented	Date	Duration	Relevant discussion themes for the study
1.	A. PD relocation Project Leader (FI)	Recordings, Field Notes	3.2015	1h	Suggestions for improvement actions
2.	B. Program Manager (Quality Manager) (FI)	Recordings, Field Notes	3.2015	1h	Suggestions for improvement actions
3.	C. Section Manager (Quality Manager) (HU)	Recordings, Field Notes	3.2015	1h	Suggestions for improvement actions

The interviews to collect the Data 2 were conducted both, through interviewing individually and by group meetings. All interviews were recorded and field notes were taken.

Data collection 3

For the final validation, the proposal was presented to the same key stakeholders as in Data collection 2. Table 3 below shows details of data collection 3.

Table 3. Validating the proposal: Data collection 3.

#	Position in the company	Documented	Date	Duration	Relevant discussion themes for the study
1	A. Program Manager (Quality Manager) (FI)	Recordings, Field Notes	3.2016	1,5h	Feedback of the proposal
2	B. PD relocation Project Leader (FI)	Recordings, Field Notes	3.2016	1,5h	Feedback of the proposal
3	C. Section Manager (Quality Manager) (HU)	Recordings, Field Notes	3.2016	1,5h	Feedback of the proposal

The interviews to collect Data 3 were conducted through workshops with the key PD relocation stakeholders. The interview procedure was the same as for Data 2 collection. The languages used in the interviews were Finnish and English. All interviews were recorded and field notes were taken.

2.3.2 Internal Documentation and Observations

For analysing the current state of product development, observations and examination of the internal reports and documentation on the relocation was also conducted, in ad-

dition to the core interview and discussions data. The internal documents included the company internal documentation library and intranet regarding the relocation. In more detail, these included the relocation Wiki pages, meeting minutes, mail attachments and also both the sending and receiving side relocation areas proprietary intranet pages.

The current state analysis also relied on the observations of both, the sending side and the receiving side of the relocation. Although the key conclusions were drawn from the interviews and discussions, making the proposal generated mostly from the collaborative, transparent, documented data.

2.4 Reliability and Validity

To ensure the quality of research, reliability and validity need to be taken into consideration when conducting research, especially for qualitative research. In general, *Validity* describes the lawfulness of the result of a study; it can be used to ensure that it sets a relevant research question and addresses correctly the intended goal set in the research. While *Reliability* describes the quality and consistency of the study results.

Validity of research is proven in a way that the rigour and the research approach are made transparent (Quinton and Smallbone 2006:126), and the solution to the research question is based on and grounded in acknowledged academic theory.

To ensure the quality of research, the reliability and validity plan has been developed for this study. To achieve *validity* in this study, the selection of data sources such as the company internal data and interviews with stakeholders was orchestrated, aiming at the research question. These multiple data sources ensured triangulation and perspectives from different angles, thus increasing the validity of the study. The evidence of data was planned to provide holistic logic and chain of evidence to allow the researcher to conduct the study comprehensively. In this study, rich evidence was planned to be collected by interviews and internal documents analysis, and observations, with all findings carefully reported to and reviewed by the company stakeholders.

The *reliability* of the research is evaluable when the research is considered as repeatable and conducted by someone else (Quinton and Smallbone 2006:129). To prove the reliability, multiple data collections and cross analysis ensures the quality of findings and conclusions. For a reliable study, the findings of the study can be replicated in an-

other context with achieving similar results, if the conditions or the study are kept similar (Quinton and Smallbone 2006:129). Therefore, for ensuring reliability, the results of a study should be repeatable when it uses the same procedures which should also be carefully described by the researcher.

In this study, to ensure reliability based on qualitative research, the research problem was focused and the approach carefully planned from the company perspective. In the next step, a wide range of data evidence was used for enhancing the reliability of the study results. In addition, the proposal was meant to be repeatedly revised with the relevant stakeholders. Therefore, reliability and validity was planned to be ensured from multiple perspectives.

3 Current State Analysis

This section analyzes the current state of the relocated PD as it is currently done in the case company. It starts by, first, overviewing the actual relocated product and, second, analyzing the product development which is being relocated. Finally, the key findings from the current state are described and summarized.

3.1 Background of the Current State Analysis of PD Relocation

The case company started the PD of one of its business critical products within the company to a location in a different country. As explained earlier, the reason is to free up people for new product development in the origin country and to reach cost savings. This move comes as part of the case company strategic goal.

In this study, the current state analysis starts from the background of the PD relocation, Section 3.1. As part of this background, it briefly introduces *the Relocated product* that belongs to a knowledge intensive industry. It also describes which *areas* are included in the PD, and suggests how *quality management activities* can be approached and discussed in the current PD. Current activities in Quality management are discussed on the example of three cases, from three Release areas. Their typical steps related to Quality management are analysed, as *prior* to the beginning of the PD relocation project.

After that, the current state analysis continues to the analysis of the PD relocation process, Section 3.2. In this section, *the ongoing PD relocation project* is described that started in the company in January 2015. First, the relocation *process* is analysed and mapped, and the findings are presented. Second, *the quality management* in the ongoing PD relocation process is investigated. After that, the strength and challenges of the current PD process are summarized based on the findings from the already executed relocation cases. This section ends with pointing to the challenges selected for this study.

3.2 Overview of the Relocated Product

The relocated product is a mobile core network node that works as a facilitating adapter between mobile networks and it has been developed for past 15 years. The product handles and processes signalling from mobile telecom network users and payload traffic when interworking between networks. The node HW is based on a number of boards which functions are handled by application platform.

In the early days of the relocated product life cycle, the telecom markets were in need of a solution which would support 3G technology requirements, guarantees that the existing links at mobile network core are never overloaded, ensures efficient media formatting in the boundaries of mobile network, and provides meaning on value added services. All these function were executed by this product.

In the first phase of the relocated product life cycle, the case company standardized the relocated product solution. Due to a background of telephone exchange SW technology culture, platforms design, broad knowledge of HW and SW design in the case company, the key stakeholders started to work on specifying and building the needed layers for the planned product.

When introduced, the relocated product was a major technological breakthrough. This was due to innovative modeling of the product. Later on, it was not anymore possible to design products by the old way. The first actual mobile network customer release of the relocated product was launched in 2001 and was immediate commercial success. The feedback from mobile network operator showed that customers appreciate the products superior scalability, configurability and access independence. During its life cycle, the relocated product experienced a number of evolutions. One of the major evolutions was the new multimedia concept which was embedded to the relocated product. This solution provides the converged Media Plane functionality in IMS networks which is needed for supporting Video calls.

Presently, The Finnish subsidiary cooperates with the subsidiary in Hungary that manufactures and provides the designed SW for this product equipment. The sending side (Finland) is responsible for controlling the product development life cycle. It reports the development requirements and found faults to the receiving side. The receiving side (Hungary) is responsible for codifying these to the product. In practice, the relocation means that the receiving side will execute the same product development and maintenance on same qualitative level as it was done in the sending side of the product development, prior to the relocation.

3.3 Overview of the PD Relocation

On the sending side of the relocation, the product development (PD) of the relocated product has been split into twelve different development areas. Figure 3 below shows the areas of the product development.

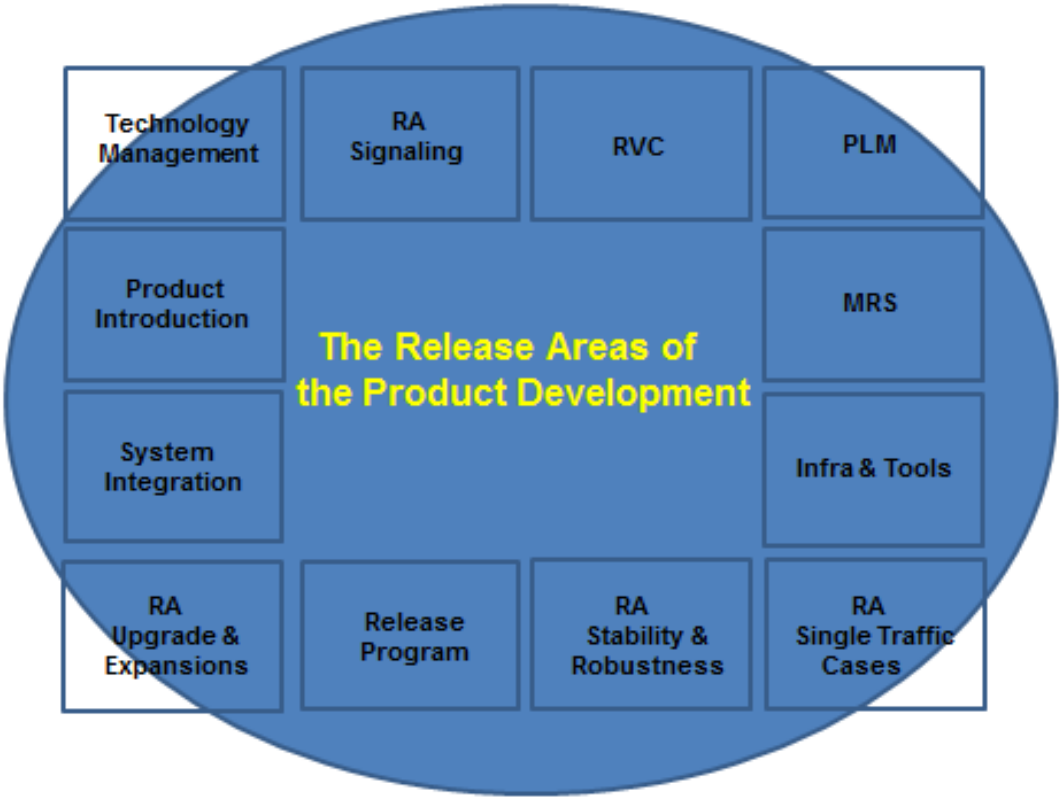

Figure 3. Twelve Release Areas of the PD.

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In Figure 3, the Product development is described as a community, where the product development and its maintenance specifically are carried out in twelve specific release areas. These areas are organized into teams and driven by Lean and Agile principles. The people working in the teams have different types of skills and competences.

For example, the Upgrade & Expansions release area is responsible of testing the product SW and HW deliveries extensively by HW expansions and different SW feature deliveries. In the other example, the Technical Management team is responsible for driving the evolution of the competitive technical solutions of the relocated product in the case company. The work includes participating actively in various innovation work and technology management forums where both technology trends and new ideas of the industry are followed. Thus, the product development has a cycle for producing and releasing high quality product to the markets.

Next, the process of product development process is illustrated on a high level in Figure 4 below.

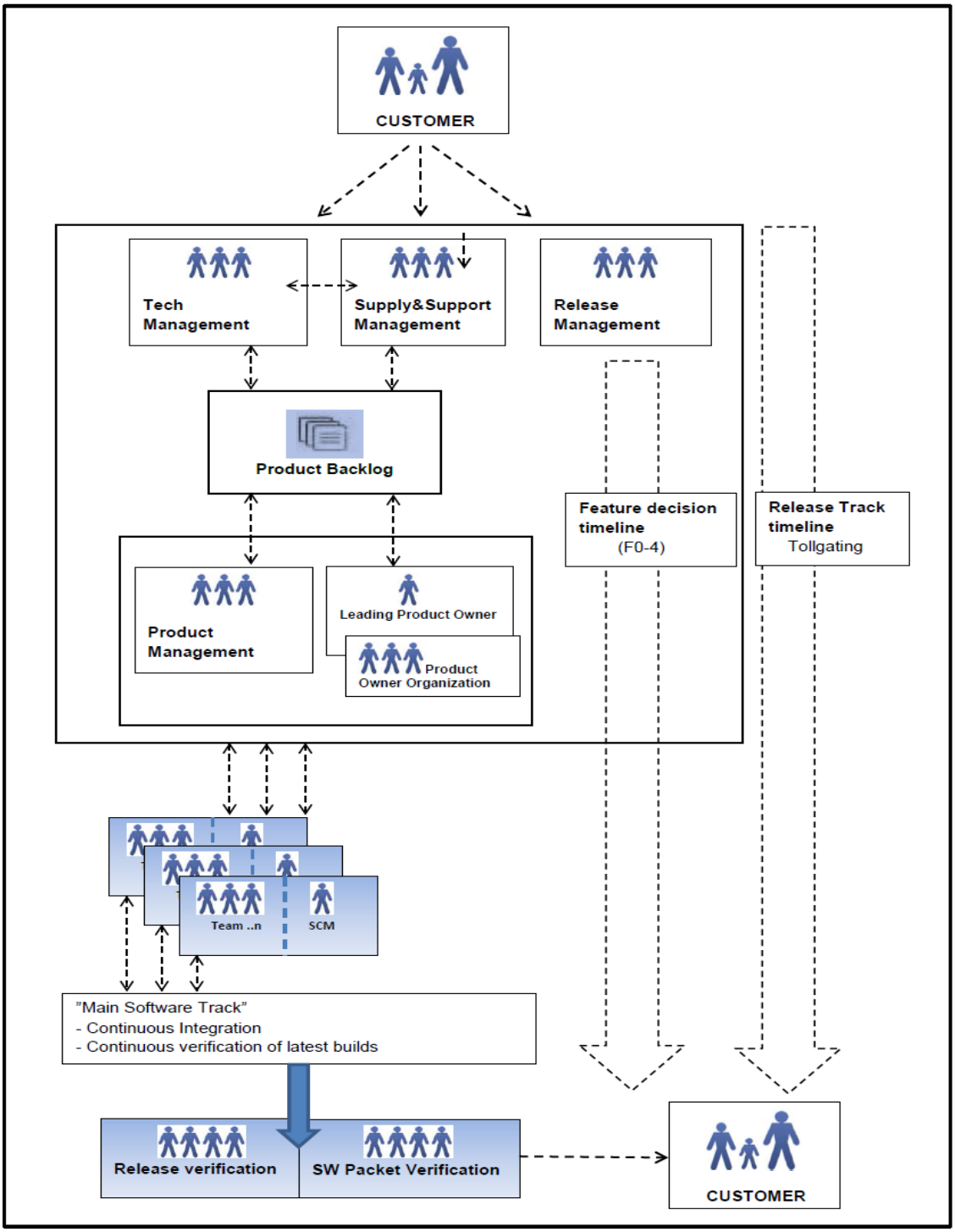


Figure 4. Overview of the Product Development process.

Figure 4 describes an overall the flow of the company product development process for the relocated product. As seen from Figure 4, the customer requirements for the new features and functionalities are handled by the company Technical and Supply management entities, in conjunction with the Release management entity. These entities examine the requirements and set the priority order based on what should be taken into account in the product development. The decisions are put to the product backlog.

The leading Product Owner forum entity examines the backlog in conjunction with the earlier mentioned entities. The examination reveals the backlog items that are embedded to the product development based on feature concept studies. The Leading product owner makes the decision in conjunction with the Release program managers how the developed feature is embedded to the product development funnel, based on the mapped resources in the product development cycle.

The Product development teams handle the actual feature development. Based on the outcome of the feature concept studies, the teams develop the features during the implementation and deployment phase. The scrum masters connected to teams are responsible for tracking the development work in the teams. The Feature integration and Release verification teams work in conjunction with the Product development where the new software is function tested on feature level. The actual features to be released are verified by the Feature integration team on the system level and by the Release area teams from non-functional requirement point of view. Release areas also take care that the legacy functionality is working from non-functional requirement perspective. The described functions follow one single main SW track. When the main track is completed, the SW package is set to the Release branch where legacy release verification is executed for the release candidate package. When the SW package is considered as ready and has passed the Release branch (agreements on tollgate and feature decision models), it is rolled out to first customer acceptance in order to validate the release in a live customer environment. After that, the SW package is launched for general availability.

This overview of the PD process demonstrates how knowledge intensive the current PD is, and how many efforts, from various teams, this product requires. It also gives some understanding behind the high quality requirements expected from this product from the customer side.

The following sub-section discusses the challenges of quality management in the PD process of this knowledge intensive product. The state of quality management is discussed on the example of three PD Release areas (three out of 12 units) and analyzed as prior to the PD relocation.

3.4 PD Quality Management Prior to Relocation (on the example of three units)

This sub-section analyzes the quality management process ***prior*** to the relocation, on the example of three Release areas. This analysis showed that the quality management steps fall into three categories: a) Actions, b) Tools and Metrics, and c) the Social ties meaning acts of communication which bind these three together. The results of

analysis are therefore presented in these three groups. From all twelve PD Release areas mentioned above, three RA were selected to exemplify the product development process. They identified the existing working practices for securing the quality of PD of these areas. The RA's are named as A, B and C.

(A) A-Release Area activities in the Quality Management prior to the relocation

Figure 5 below describes the actions, measurements and social ties practiced by A Release Area in their daily work and related to managing and securing the quality of the PD (*prior* the relocation). This diagram is built based on the findings from the discussions and documentation in A- Release Area.

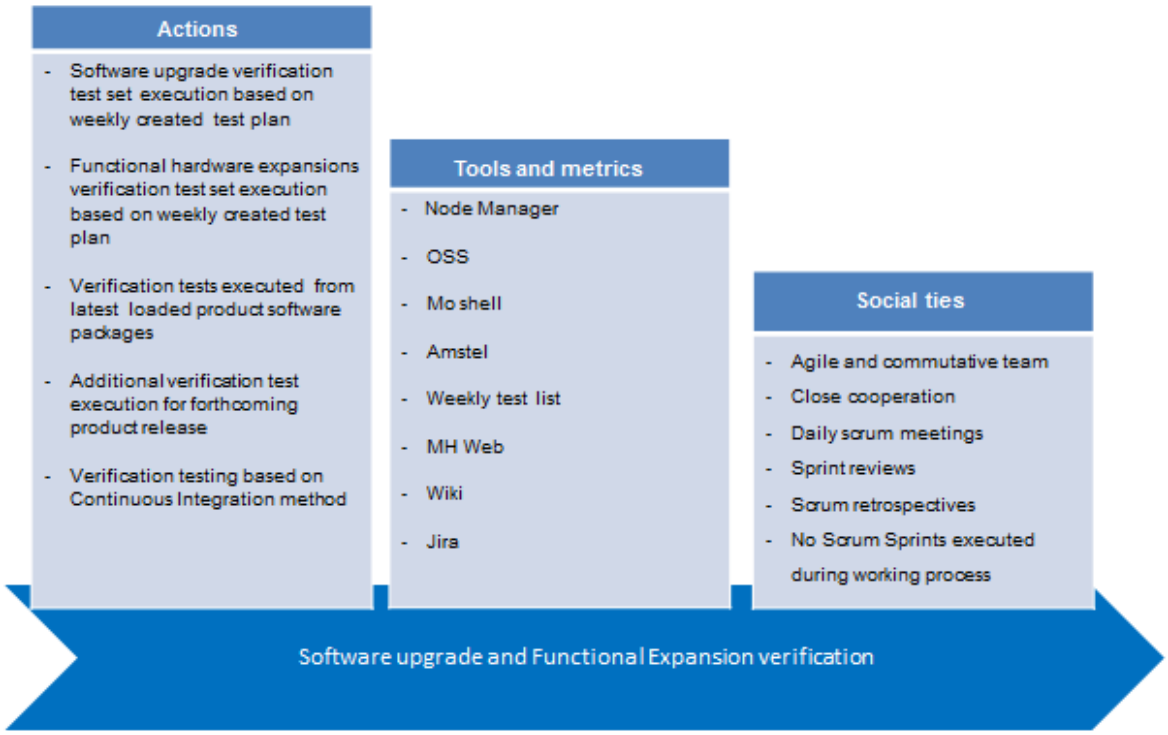


Figure 5. A-Release Area activities for PD quality management.

Based on the interviews with the stakeholders from the A-Release Area, their daily work can be divided into three main activities, as shown in Figure 5: (a) actions, (b) tools and metrics, and (c) social ties. All three activities of elements are discussed separately below.

First, *the Actions* include various tasks in SW and HW testing, and verification. In practice, it means that based on the weekly test execution plan, a set of software upgrade paths and various functional expansions are verified by A- Release Area. Software upgrades are executed on a weekly basis using a complete set of current product SW

packages which support the latest system software version. This is produced by Continuous Integration machinery in the case company. Continuous integration concept is a software engineering practice that includes segregated changes in the software which are rapidly tested and reported at the time when software is added to a larger codebase. The goal is to correct the software faults as soon as possible to the code base.

Second, in *the Actions* part, SW upgrade paths are divided into four sets. First, once a week, one set of loaded and executable software is verified from which the upgrade is done for the new SW package. The procedure is executed in a round robin order. Every night, the latest local software version is automatically upgraded into a product test node from a pre-defined, older product software package. The produced logs and status of the product was roughly checked every morning. If something suspicious had happened, a manual SW upgrade was repeated or trouble shooting was started. Second, HW expansion verification test cases are also executed in the same way, in weekly sets, as software upgrades by the Sending side. Many of the expansions include manual handling of the product HW equipment. This meant that such procedure could not be completely automated. However, some verification expansion scripts could be executed remotely. In case of a forthcoming product release, a separate test program is executed and results are tracked in Wiki pages. Input for this program is based on various sources and prepared by the Scrum Master with co-operation of Product Management. The new software could be taken into use in two ways for the product; by either upgrading from older software package or by initial upgrade, when installing a new product node or after emergency recovery. After initial installation or upgrade, the contents of the executing package must be identical to be admissible for the product release.

Third, In addition to the Actions, the A-Release Area also utilized the relevant *Tools and Metrics*, related to securing quality. Their tools and metrics include both the previously explained general quality statement tools, but also proprietary tools for securing the quality. In practice it means that, in the A-Release Area, various sub-tasks have proprietary tools, metrics and documentation. Table 5 below describes the most widely used tools and metrics of the A-Release area on a high level:

Table 5. Tools and Metrics for securing quality in A-Release Area

#	Name	Definition	Function	Deployed by
3.1	**Node Manager**	Graphical tool for the product management.	Manual upgrade path verification and HW expansion testing.	A
3.2	**OSS-RC**	System manager for product network elements.	Operation support system for upgrades path verification.	A
3.3	**Moshell**	Text-based Element Manager for nodes under product development	Product development Element Manager used for SW verification and HW expansion/ product SW package comparison.	A
3.4	**Amstel**	Automated product system testing tool	Product verification on different loads	A
3.5	**Weekly Test List**	List of software versions to be tested (Prepared weekly).	Guideline for verification tests.	A
3.6	**MHWeb**	Fault reports database.	Fault reports of the product development.	A
3.7	**Wiki**	A web page allowing product development community communication.	Repository for various release area issues e.g. documentation, test reports, tools guides and tracking of fault reports (linkage to MHWeb).	A
3.8	**JIRA**	Product development tracking tool for project management.	Allows Cross organizational task distribution and tracking of product development related issues.	A

As shown in Table 5, in addition to the general quality statement tools, the A- Release Area evaluates the quality level of the product development also by proprietary tools. The tool 3.1 is utilized for the SW upgrade and HW expansion tests verification for proving the product functionality from its distinctive structural layers. The tools 3.4 automate the testing of the product, and provide analyzed results.

Finally, in addition to the Actions, and Tools and Metrics, A-Release area also utilized *the Social ties* (as shown earlier in Figure 5). The relevant Social ties in their daily work, helping to secure quality, rely on the agile process approach. In practice, A-

Release team is agile and commutative; daily stand-up meetings are held only if needed because A-Release team was closely seated. The scrum retrospectives were held with Product Manager after major product releases. However, there is no scrum sprints included into work process, since they are not found relevant.

In general, these daily practices were shaped over the years when the PD process was developed by the sending side. Even if after some organizational changes, the tasks were same. As Interviewee A explained:

> *"During the last five years, the Release Area was modified and re- constructed several times. Even so, daily routines and tasks tend to keep the same as people had in their former groups. Different sub-tasks had own proprietary tools and support documentation".*

This response says that most of the daily work was executed manually, whereas only some complementary automation was embedded to the A-Release daily work to diversify the methods of verification and ease up the analyzing of the verification results. Therefore, A-Release area remains very knowledge intensive and special efferent were taken to secure quality of PD there (though these efforts were not clearly documented).

(A) B-Release Area activities in Quality Management prior to the relocation

Based on the discussions and documentation from B-Release Area analyzed in this study, the (a) Actions, (b) Tools and Metrics, and (c) Social ties were also applied by B-Release Area. B-Release utilized the following daily activities for securing quality of PD (also analyzed *prior to the relocation*).

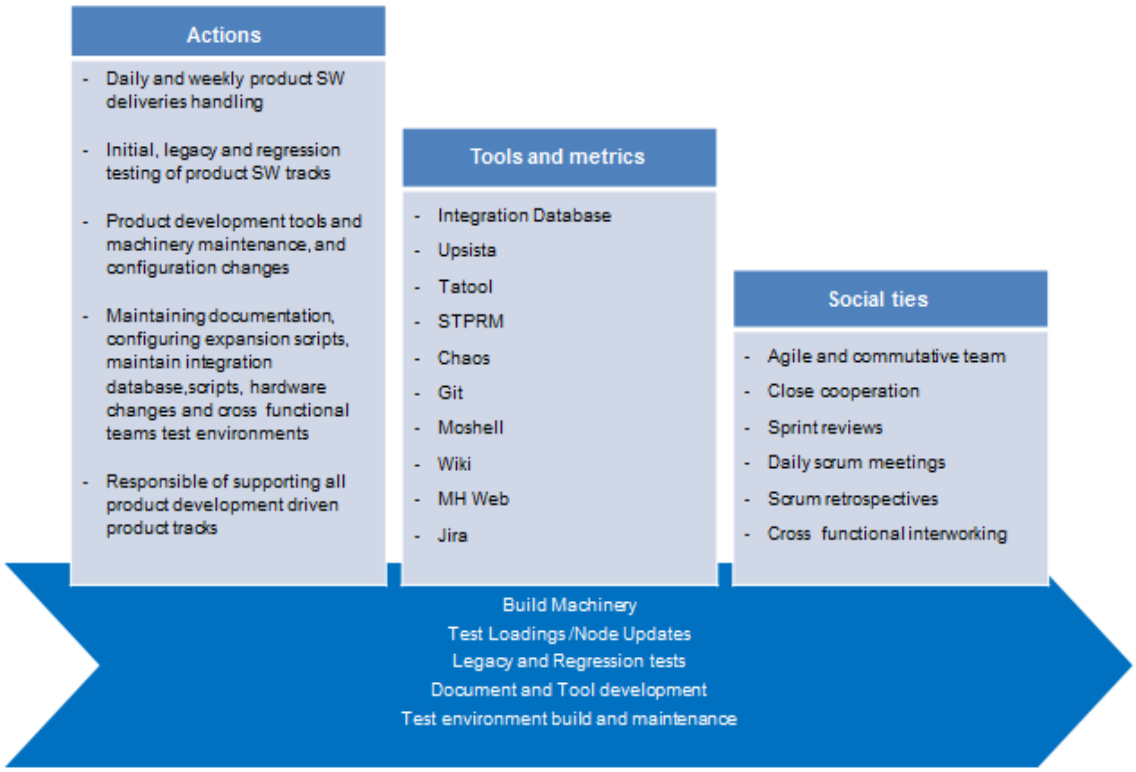


Figure 6. B-Release Area activities for PD quality management.

As shown in Figure 6, B-Release area had more responsibilities compared to A-Release Area. A-Release *Actions* consisted of daily and weekly test cycle using the latest local SW version. In addition, weekly test was done by the latest system SW version. Consequently, B-Release Area performed legacy and regression tests after the latest system SW version was available. Based on these actions, the SW release packages were created and delivered on a quarterly basis. In addition, B-Release area supported daily SW build machinery, integration database, and supported other release areas when required. Overall, B-Release area was responsible for supporting all driven product development tracks. As interviewee C from B-Release area described:

> *"We were basically a body of several groups based from research and development areas".*

This response shows that, in general, when comparing A and B Release areas, B-Release was in the forefront of responsibility due to the fact that they did the requirement specifications, planning, implementing and supporting actions for other release areas.

In addition, B-Release Area performed various sub-tasks which required proprietary *Tools and Metrics*. Table 6 below shows the most widely used tools and metrics by B-Release area on a high level.

Table 6. Tools and Metrics for securing quality in B- Release Area.

#	Name	Definition	Function	Deployed by
4.0	**Integration Database**	Web based Internal database	Centralized database for product development content tracking and delivery information	B
4.1	**UPSISTA**	SW packaging tool	Collect and packages the developed SW.	B
4.2	**TATOOL**	Tool for SW Verification	Produces system SW configuration version packages and upgrades to product/ verification tests	B
4.3	**STPRM**	Product development based Web equipment Manager	Task manager for product development equipment	B
4.4	**Chaos**	Information database	Product development HW and its connectivity information.	B
4.5	**GIT**	Version handling database	Central repository for product development version control	B
4.6	**MOshell**	Text-based Element Manager for nodes under product development.	Product development Element Manager used for upgrade debugging	B
4.7	**Wiki**	A web page allowing product development community communication.	Repository for documentations and reports of test tooling guides and results. Tracking of fault reports (linkage to MHWeb and Integration database)	B
4.8	**MHWeb**	Fault reports database	Fault reports of the product development.	B
4.9	**JIRA**	Product development tracking tool for project management.	Allows Cross organizational task distribution and tracking of product development related issues.	B

As shown in Table 6, in addition to the *general quality statement* tools, B-Release Area also evaluates the quality level of PD also by *proprietary* tools. For example, tool 4.0 is utilized for the fault corrections, delivery information and SW package and its control file handling the product development. In addition, tool 4.3 produces system SW configuration version packages and executes also automated upgrade tests and additionally product verification tests.

Finally, in addition to the Actions, Tools and Metrics B-Release Area also utilizes *the Social ties* (as shown earlier in Figure 9). The relevant Social ties for securing quality also rely on agile process approach. In practice, B-Release Area also followed the agile principles in their daily work by being commutative, and holding daily stand-up meetings regularly. The scrum retrospectives and scrum sprints were included into their work process. As explained earlier, B-Release Area is also responsible for supporting all PD research and development-driven product tracks in the company. Due to this extensive role, B-Release Area had good communication and inter-relationship with other release areas.

In general, daily work of B-Release Area consisted of high standard multilateral entity handling developed by the sending side over the years. It consisted of continuous requirement handling and improvements, not only to the developed product but also to the product testing environments. As interviewee B described:

> *"We absorbed all the required features and studied them. There were many and they were required for securing the quality of the product development cycle".*

Thus, the daily activities of B-Release Area were really complex and knowledge intensive, and the role of B-Release Area in successful releases was very considerable. Accordingly, the activities related to quality management were also more complex and demanding.

(A) C-Release Area activities in Quality management prior to the relocation

Based on the discussions and documentation in C-Release Area, the quality related activities of C-Release area also fall into: (a) Actions, (b) Tools and Metrics, and (c) Social ties. In C-Release Area, these activities included the following daily practices for securing the quality of PD (also analyzed *prior to the relocation*).

As seen in Figure 7 below, the C-Release Area *Actions* were mainly based on daily tests of latest local SW which included the new features of the product. In addition, the verification was executed by the latest system SW version over the weekends by using automation tools. Consequently, C-Release Area executed release delivery testing and emergency release delivery verification if required by the PD management. In addition, C-Release Area also did tool testing and contributed to tool development for the Tool design team, and assisted in customer fault verification. Automation tool was developed and deployed for testing the SW versions produced by the product development.

The identified (a) Actions, (b) Tools and Metrics, and (c) Social ties of C-Release Area are shown in Figure 7 below.

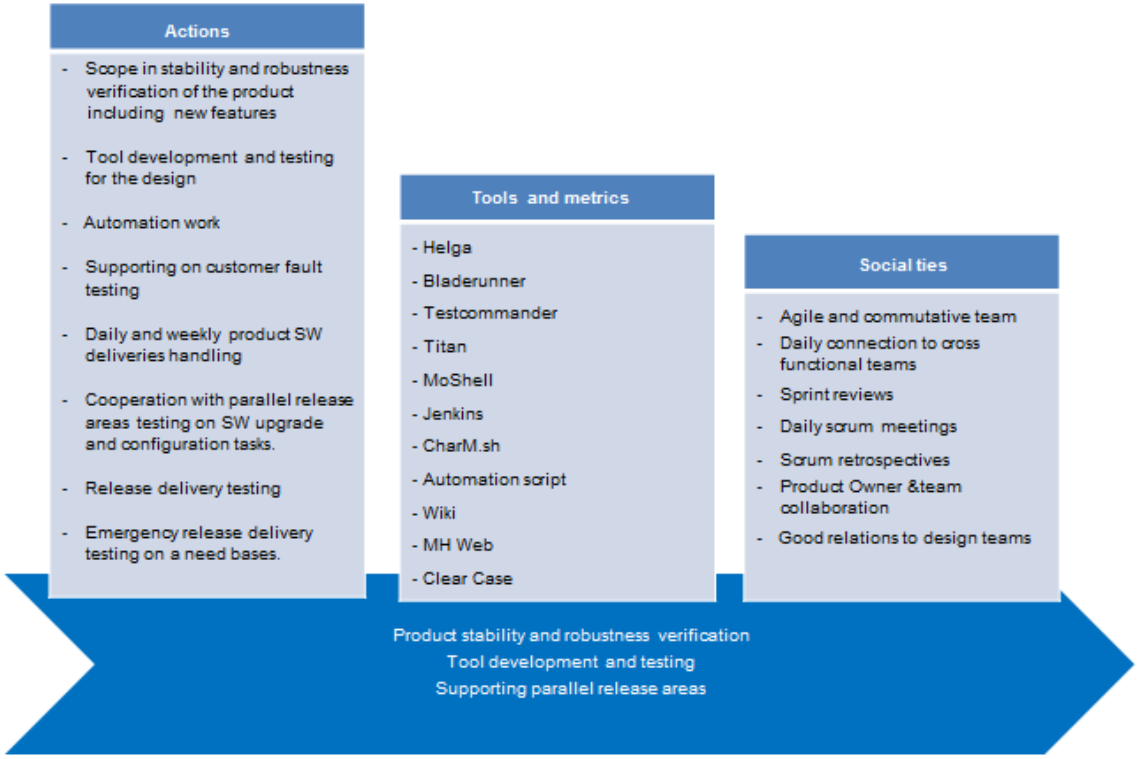


Figure 7. C-Release Area activities for PD quality management.

Figure 7 shows that, in terms of *Actions,* in addition to the routine quality related actions, C-Release Area also cooperated with other PD release areas (including A and B-Release Areas). As one of C-Release Area Interviewee D described:

> *"We had constant cooperation and weekly meetings with the other release areas and verification laboratory support team, due to rebuild and configuration of the test network".*

This response demonstrates that, in general, the C-Release Area had the verification equipment pool divided between its members. Almost all verification equipment was frequently rebuilt together with the Test environment laboratory support team for supporting the releasable features. C- Release Area also had broad connection to the parallel verification laboratories for testing the required features. In addition, the C Release In addition, C-Release Area contained various sub-tasks which have proprietary *Tools and Metrics,* as well as documentation. Table 7 below shows the most frequently used tools and metrics of C-Release area on a high level.

Table 7. Tools and Metrics for securing quality in C- Release Area

#	Name	Definition	Function	Deployed by
5.0	**Helga**	1.Traffic simulator	Creates real User plane traffic for testing the product as in real environment (load generator).	C
5.1	**Bladerunner**	2. Traffic simulator	IP tool application platform for Voice over IP and Video call testing.	C
5.2	**Testcommander**	3. Traffic simulator	Simulator for generating traffic for tests.	C
5.3	**Titan**	4. Traffic simulator	A collection of protocol modules, application & load libraries, test-ports) necessary to create efficient load test applications.	C
5.4	**CharM**	Measurement script	Measurement of the product characteristics when the product is under traffic load.	C
5.5	**Jenkins**	Open source integration server	Verification machine for continuously testing the developed SW build stability and robustness.	C
5.6	**MOshell**	Text-based Element Manager for nodes under product development.	Product development Element Manager used for upgrade debugging	C
5.7	**Wiki**	A web page allowing product development community communication.	Repository for documentations and reports of test tooling guides and results. Tracking of fault reports (linkage to MHWeb and Integration database)	C
5.8	**MHWeb**	Fault reports database	Fault reports of the product development.	C

As seen in Table 7, C-Release Area extensively utilized various traffic load generators (#5.0-5.3) for verification to prove the stability and robustness of the developed product. The main purpose of these generators is to create traffic for reflecting the real live customer network environment for stressing the product SW and equipment. In addition, the 5.5 Jenkins is used as a verification tool for testing and reporting the isolated changes in SW build. It enables developers to find and solve defects in the developed code base rapidly and to automate testing of the SW builds of the developed product by continuous integration method. The purpose of continuous integration is to increase the velocity of product developers and teams, and, at the same time, ensure that builds are not defected, which makes this tool into one of the quality management activities.

Similarly to A and B-Release Areas, C-Release Area also utilized *Social ties* (as described earlier in Figure 7). These Social ties consisted mainly of agile process approach, the frame of scrum activities, and meetings (the same as in the other PD release areas). C-Release area had to be more commutative and responsive around the other release areas due to its responsibility of proving reliability for the product stability and robustness. As a result, they had good cooperation with development design in the areas of new feature introduction and fault reports handling. In addition, C-Release Area had a tight cooperation with the test laboratory environment support team as explained earlier. After the daily and weekly verification of the release SW, C-Release Area distributed the test result information to product development stakeholders after every finished test execution run.

Summing up, C-Release Area activities, which relate to quality management, included considerable responsibility for product stability verification, in the sense, that the product works should be stable and robust prior to the SW is released to the customer. As a result, PD in C-Release Area during the development was closely looked at from the product stability point of view. As one C-Release Area interviewee D described:

> *"Also product lifecycle have to be taken into account while doing product development, it might have effect of the daily activities and therefore for the product release quality".*

However, as this example shows, in this case, there were no considerable actions required because the product and its development cycle were already in a mature form.

In summary, for all three Release areas A, B and C, the release areas have different activities for securing quality in the product development, as was demonstrated in examples above. However, though their *Actions* did differ, *the Social ties* were substantially the same. This is due to the fact that agile process is a dominant approach utilized across the product development in the whole case company. Finally, Table 8 below combines *the Tools and Metrics* which were used to secure quality of the PD *prior to the relocation*.

Table 8. Tools and Metrics for securing quality in A, B and C Release Areas.

#	Name	A	B	C
1.	**Customer fault ticket chart of the product**	X	X	X
2.	**All open fault ticket chart of the product**	X	X	X
3.	**Release assessment**	X	X	X
4.	**The Release Area radiator tool**	X	X	X
5.	**Wiki**	X	X	X
6.	**JIRA**	X	X	X
7.	**MHWeb**	X	X	X
8.	**Moshell**	X	X	X
9.	**Node Manager**	X		
10.	**OSS-RC**	X		
11.	**Amstel**	X		
12.	**Weekly Test List**	X		
13.	**Integration Database**		X	
14.	**UPSISTA**		X	
15.	**TATOOL**		X	
16.	**STPRM**		X	
17.	**Chaos**		X	
18.	**GIT**		X	
19.	**Helga**			X
20.	**Blade runner**			X
21.	**Test commander**			X
22.	**CharM**			X
23.	**Jenkins**			X

As seen in Table 8, approximately one third of the Tools and Metrics were commonly utilized in the product development life cycle. The rests of them are proprietary tools used by each release area separately. The Tools and Metrics were learned, to a large extent, through common activities and displayed in the company Wiki pages, internal documents and in cooperation between the PD Release Areas. This comparison demonstrates that the Release Areas have some similarities in their approach to understanding and securing quality in the product development. These similarities allow for applying a similar approach also to the situation when the quality needs to be secured **in the course of** *the Product development (PD) relocation.* Before this challenging situation can be discussed, the study first needs to discuss the PD relocation process *per se.*

3.5 Quality Management in the Ongoing PD Relocation Process

Currently, the PD relocation of the designated product started and was completed for most of the product areas. The relocation has overall succeeded in these areas. There is however some areas where the relocation is still planned, but not executed. This section describes the ongoing PD relocation process and analyses the steps in Quality Management during the current PD relocation.

3.5.1 Ongoing PD Relocation Process

The current timeline of relocation for each Release Area is presented in Figure 8 below.

Figure 8. Planned time line of the PD relocation process.

As seen in Figure 8, each product development area is highlighted in red colour in its dedicated time line for product responsibility relocation. The blue marks at the end of certain red lines highlights the product relocation process which could take significantly longer period of time as the pre-defined plan indicates. This reason is that after the pre-planning phase it is noted that these areas have broader tasks and roles which need more extensive planning and work for relocating.

Originally, the relocated product responsibility work started by phased planning meetings and workshops between the sites during February 2014. The setup for relocating is based on the original product development way of working of the sending side. However, currently, because the actual product development scope is declining due to the descending development life cycle of the product, the trend of the actual product releases is reducing and there is currently too much overhead. For this reason, the plan how extensively the product development is continued and how much people is needed at receiving side of the relocation is developed. In general, the goal is to map and agree on the strategy and scope for the product development areas of the relocation due to narrowing scope of the product development and increasing maintenance work of the product; the mutual collaboration agreements and mapping of product responsibility area capabilities at receiving side are identified. The relocation time line and building phases towards competence and skills relocation for selected areas are planned in the relocated product development areas. The current overall time line of the relocation for each area is presented in the Figure 8 above.

The current relocation has been controlled by the management team and executed by the technical staff from both sides of the relocation. Currently, the only reporting tool for tying the relocation is the company internal Wiki-page which combines the time plan of the relocation (presented in Figure 5): Epics, JIRA tickets, user stories, information of the product areas affected to relocation, blog posts and meeting minutes. Presently, since there is no effective presentation for the relocation process yet in existence, the researcher of this study summarized descriptions from various areas of the PD and presented a high level illustration of the process as shown in Figure 6 below. This description is based on the observations and interviews listed in Table 1, Section 2.3.

Steps from both sides, from the sending and the receiving countries, are shown in Figure 9 which demonstrates the PD relocation process from Country A to Country B.

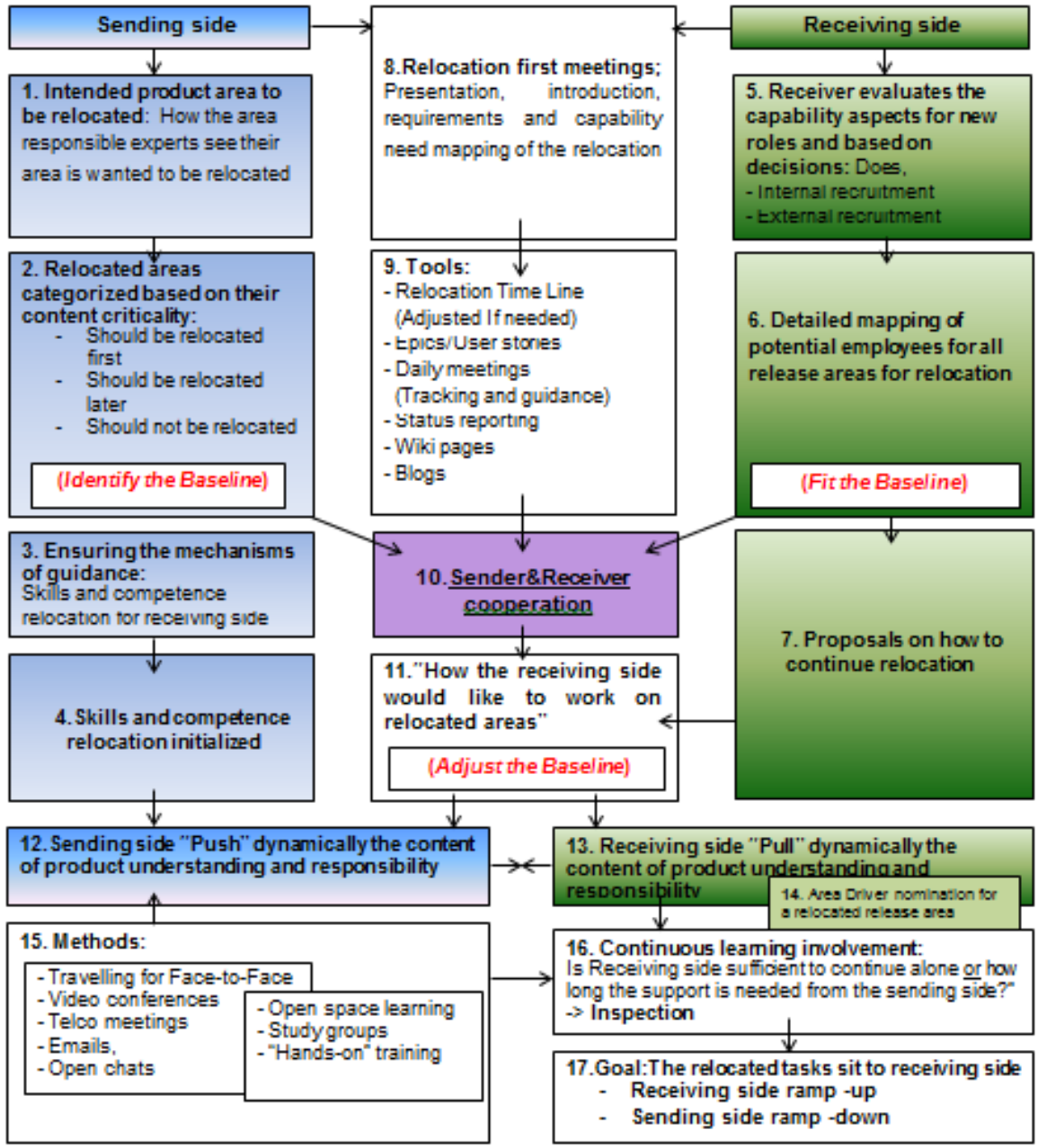


Figure 9. The PD relocation process from Country A to Country B.

Figure 9 above describes the actions from both, the sending and receiving sides when executing the PD relocation. First, the motivation to start the relocation is committed by both sides at the beginning of the relocation process. Both sides of the relocation mutually understand why the relocation is required. Here, the *Baseline* will be created where all the relocated product area functions, related skills and competences requirements for relocating are agreed on. Additionally, the sending side is committing for relocating the product fully and receiving side acknowledges their commitment for complete product responsibility after the relocation has concluded.

In Figure 9, the steps in relocation process are described one by one and divided into actions from each side of the participants starting from the top down:

Actions by the Sending side of relocation [1-4]

When the decision is done for the product relocation, the sending side technical experts discuss the *intended product areas to be relocated* in detail by defining the way how and when the areas should be relocated. The relocated areas are categorized based on their content criticality under three categories (*Identify the baseline*):

- Product area should be relocated first
- Product area should be relocated but later
- Product area should not be relocated.

The sender of the intended product to be relocated *ensures the mechanism of guidance* for the competence and skills to be correctly delivered to the receiving side. When this is secured, the sending side *initiates the competence and skills relocation*.

Actions by the Receiving side of relocation [5-7]

Concurrently, the receiving side plans and *evaluates the capability aspects for the new roles* of responsibilities to be received in the relocation. The receiving side gives proposals on issues such as how they would see they would work on the product development and maintenance responsibility for the relocated areas. For the capability aspects, it is evaluated what is the current competence and skills levels. If the capability for relocated area does not exist, *internal or external recruitments* are used. In case there is no capability found to fill the positions, the area or task is put the on hold until till it is found for the relocation. When the capability exists, detailed mapping of the potential employees for the areas for relocation is executed (6); place the correct potential to correct relocated area positions (*Fit the baseline*).

Sending and receiving side cooperation [8-17]

When the motivation and commitment is established for the relocation, as described earlier, the *first meetings of the relocation* are grouped. In the meetings, the relocation structure is built in high level; overview of the relocation is presented, preplanned requirements are introduced and the capabilities of both sides for handling the relocation are mapped. The *tools* for deploying the tasks for relocation are created. E.g. Epics are disaggregated into user stories which are used for communicating the relocation to all levels in the organization internally. On Agile approach, Epic is a descriptive entity inside a backlog which identifies the functional goals of a development effort for each

area of product responsibility relocation. One Epic can contain subset of User Stories. A User Story is a functional increment, a definition of a requirement which contains information. Hence, the people working on the requirement can produce a reasonable estimate of the effort they need to implement it.

The sending and receiving side cooperation combine the earlier described functions together for the relocation. Here, the primary goal is to agree the required tasks of the relocation so that they sit to receiving side; how the receiving side would like to work on relocated areas (*Adjustment to baseline*).

When the baseline is agreed upon, the sending sides push the content of product understanding and its responsibility to the receiving side. Sending side utilizes several *methods* for pushing the content dynamically by e.g. face-to-face meetings for distributing the competence and skills for groups at the receiving side. At the same time, the receiving side adapts and mutually pulls the content towards itself. During this procedure, the receiving side nominates a technical person or persons to lead responsibility of the relocated product area on their side.

Relocation it is constantly tracked by the leaders of the relocation; has the receiving side of the relocated product areas reached the level to take the complete responsibility and continue the product work alone or to what extent the support of the sending side is still required (=*continuous learning involvement*). There are two reasons for the tracking; first to reach the *goal* of mutual understanding and the decision when the sending side can ramp down and finalize the relocation responsibilities, and secondly when the receiving side takes the full responsibility of the product.

3.5.2 Findings from the Ongoing PD Relocation Process

Three Release Areas, A, B and C, which were selected to exemplify the PD process through their daily activities in Section 3.1.3, are taken again as example cases for the PD relocation process in this section for collecting and analyzing the data for the Quality management analysis. All three release areas have now been relocated from Country A to Country B. The relocation analysis was done based on the observations, interviews and internal documentation. These three areas were chosen as examples because they all present the basic context of the actual PD and therefore are suitable for analyzing the quality management activities. The analysis below starts, first, with the comparison of the PD process and then continues to the quality management issues.

The findings which emerged from the interviews, observations and internal documentation show that the relocation activities of the three PD Release Areas A, B and C were quite similar, from the relocation point of view. The findings are marked on the PD relocation process map and presented in Figure 10 below.

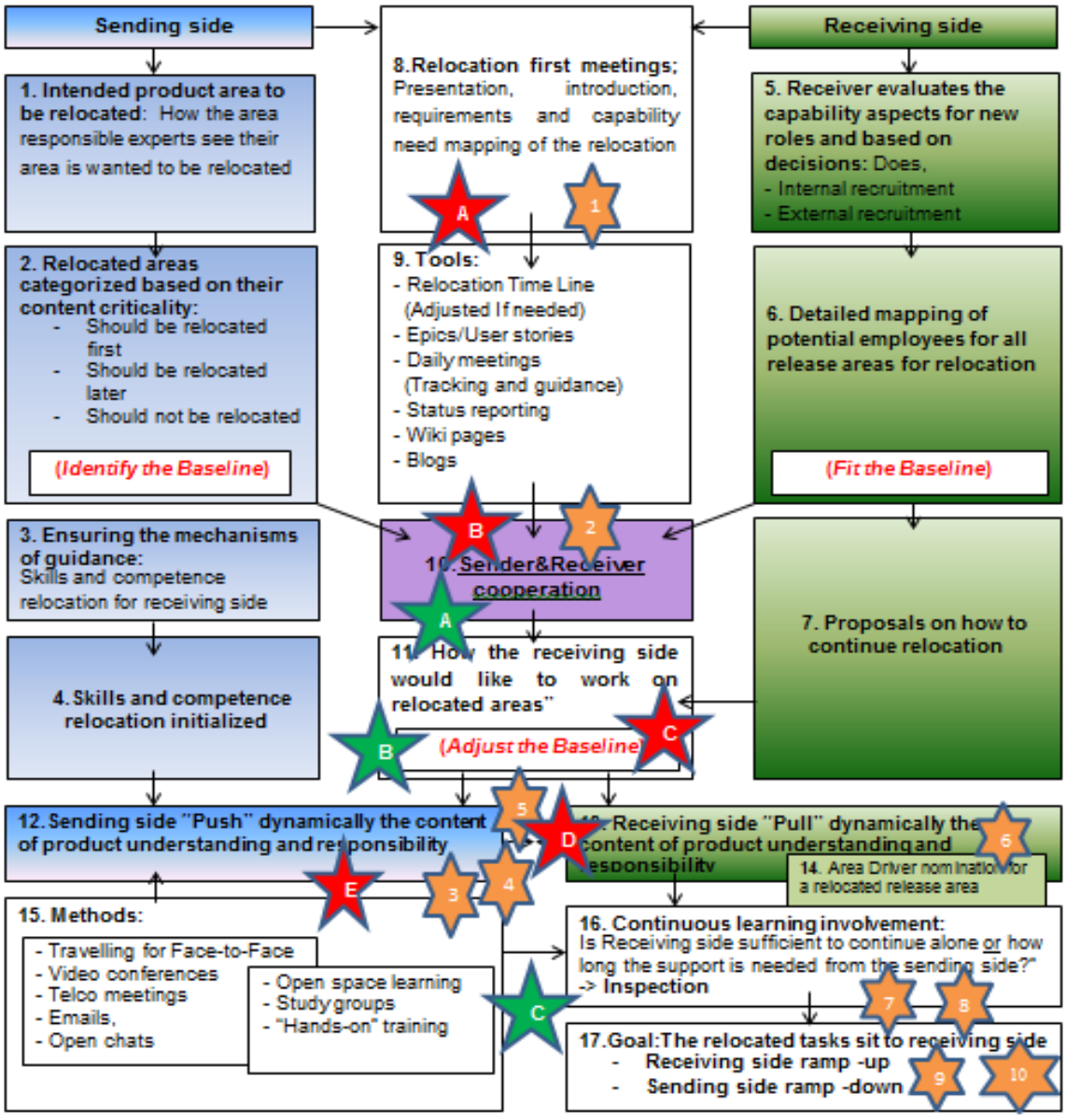
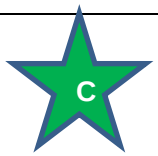


Figure 10. Findings from the PD relocation based on the analysis of the A, B and C Release Areas.

As shown in Figure 10, the general relocation activities were executed by both sides of the relocation. The activities are numbered and they correspond to the executed PD relocation occurrences from quality perspective; what qualitative actions were done in the relocation process to secure the quality of the PD relocation and how the both sides handled them. These key activities of the PD relocation for A, B and C Release Areas

as are described in Appendix 2. In addition, the strengths and challenges were detected during the relocation processes. The key strengths and challenges are listed in Table 9 and 10 below.

Table 9-10. Key strengths and challenges in PD relocation of A, B and C Release areas.

#	Key Strengths in the ongoing PD relocation
	Relocation time line: Dynamic and adjustable time line based on business needs. Also experienced more trustworthy approach where tasks fit better.
	Contributing relationship: Continuous availability and commitment for sharing competence and skills. Feel of working together for common goal.
	Relocation alignment: Adequate relocation steering, orchestration and overall management.

#	Key challenges in the ongoing PD relocation
	Capability, competence and resource challenges: - Capability, competence and resource shortage at the receiving side
	Communication challenges: - Failure in review communication - Misleading communication in the beginning of the relocation process
	Documentation challenges: - Variety of ambiguous and rogue documentation. - Content of backlog user stories is shallow.
	Quality challenges: - Deficient handling of quality in PD relocation. - Daily work reinstated by sending side for securing the quality of the product development life cycle.

Based on the data analysis, main activities of A, B and C Release Areas in PD relocation were basically similar with the rest of the Release Areas which were relocated to the receiving side. Since the main focus in placed on investigating the challenges oc-

curred in the PD relocation, the challenges were discovered in relation to *capability, competence, resource, communication, documentation and quality,* as shown in Table 19.

As the case company focuses on the PD relocation and aims to reach cost savings, the understanding of quality requirements is a key area of the relocation for ensuring that the level of quality is not compromised during the relocation process. The findings from the data prove the fact that quality management makes an integral part of the relocation. Based on Tables 18 and 19, the key strengths and challenges are as follows:

B. Strengths in the ongoing PD relocation:

(1) Relocation time line

The PD relocation time line was found as the most important strength by majority of the interviewees. Early involvement had been already started few years earlier in certain relocation areas for sharing the skills and competence to the receiving side; areas started also pre-work earlier before the actual relocation was initiated. The relocation to the receiving side is executed by cascading the tasks; start competence and skill implementation gradually by building from elementary items or starts on already competent areas and finally work the way up to implement the area which needs the most competence and skills. For example, as interviewee 6A explained:

> *"There is no strict time line in our area relocating, and therefore it is proceeding well. We have thoroughly done required pre-work and had one extra year for actual relocating of the area - our team is on good track".*

As seen from this example, the interviewees experienced that the relocation is very well adjusted; dynamic time line is adjustable based on business needs. It is experienced more trustworthy approach compared to classical transfer of PD because the content of the relocated tasks fit better to receiving side. In a classical Transfer case, the time line for relocation is much stricter for handing over the work. Also, communication if felt cumbersome in classical transfer. In addition, the employees at the Receiving side had grown more experience on the product; there is no push or over-commitment occurring in the relocation. As a result, receiving side does currently lot of relocated area specific tasks by themselves, without the support of sending side.

(2) Contributing relationship

The contributing relationship was stressed, where the sending and receiving side culture of collaboration has been seen as strength. The sending side shown experience of

the product, availability for support and commitment for sharing competence and skills, which were seen as major contributory factors. Consequently, commitment and dedication for relocating enforced the feeling of content ownership in the receiving side. It is a common interest to have successful product release deliveries in the future. Therefore, both sides of relocation were felt as one organization working together for common goal.

(3) Relocation alignment

The product relocation alignment was also seen as effective. The relocation steering and management was experienced adequate. The relocation frame planning, proactive and reactive actions, and organizing assistance and support for the receiving side was orchestrated well according to interviewees. Orchestration here means that the cycle of relocation is constant for each release area even if some tasks inside the relocation procedure were stopped for re-planning.

C. Challenges in the ongoing PD relocation:

(A) Competence, Capability and Resource challenges

At the time of relocation of competence and skills, the flow of the relocation process was slowed down in some areas due to a shortage of potential and competent employees at the receiving side. Additionally, the unfamiliar tasks were experienced as “black box” by the receiving side. This had negative impact on daily work. As Interviewee 2A from the receiving side pointed out:

> *“The relocation area content and actual size of the areas was a surprise; we might have heard about them but we were not sure what it covers. We definitely underestimated tasks and therefore we had to re-plan quite many things”.*

In some areas at the Receiving side, there had only marginal experience and only some technical understanding at the start of the PD relocation; some roles required deeper experience in competence and skills. In addition, the receiving side took too many liabilities at the same time which were not aligned on their current capabilities; the pace of the pulled tasks was too fast which resulted to overload situation; some tasks were put on hold due to search of expertise. As Interviewee B2 argued:

> *“We had issues, where we had to delay some areas relocation to find right people on positions.”*

As seen from this example, the complexity of some relocated areas set challenges and therefore requires certain competence and skills baseline. They cannot be taken and

absorb too rapidly. Since the receiving side has limited knowledge of required baseline, it took a relatively long time till adequate competence and skills baseline were reached.

On the other hand, this flaw in the capability reveals the need for the securing the skills and competence of the personnel when the work is started to be relocated. As the sending side Engineer D pointed out:

> *"The receiving side did not had capability ready, so they jumped between areas of work. This meant that we had to return to execute already relocated work ourselves"*

This comment points to unawareness of the magnitude and content of the actual work relocated. It also reveals the internal resource planning problem between the sides which need examination more specifically.

Consequently, the receiving side investigated how to tackle against these shortages and pursue a way to map and list required competences and capability needs. Search for expertise and build-up for required competence and skill were carried out. However, the pace for such actions was too slow in some relocation areas. In addition, assessment of the starting point of the receiving side's readiness was considered but not eventually carried out. Due to these reasons, the relocation delivery was delayed in these areas.

The shortage in the resources reveals the improvement action for the securing the presence of available personnel when the PD work is started to be relocated. As the receiving side Interviewee A pointed out:

> *"We did not had available resources so we needed to recruit and naturally, we are in a rush to meet the release delivery objectives"*

As seen from this example, after getting the resources in place, it is essential to ensure the capability of the receiving site. The sending side relocates the PD skills and competence to receiving side which is less experienced and has less knowledge on the product.

(B) Communication challenges

In a relocation of responsibilities, one of the primary issues is the review of the relocated tasks. The tasks review is performed during the competence and skills relocation; the responsible(s) from both sides of the relocation work on same tasks, where the sending side employee teaches the relocated task to the receiving side employee(s).

The task execution and performance is then reviewed and rated. Interviewees saw that the reviews are communicated and shared to areas in varying degree: some areas never received explicit information automatically but only by asking it separately from the sending side. As the receiving side interviewee 7A pointed out:

> *"Now we are in the phase to make tasks ourselves without active help – if there is a problem on review we would like to see them also and not be excluded".*

This comment demonstrates that sharing information makes relocation transparent and therefore more confident. Transparency in communication encourages employees and allows them to see the influence they have on the performance of the organisation. Moreover, trust and transparency in communication should be acknowledged to reach the acceptable level in PD relocation. In one example, the receiving side started some not-planned work during the relocation. They started on automating the tasks and did not communicate it to sending side. This was halted by the relocation leaders as the results were not in line with the relocation plan; the receiving side was not yet fully grown to the required tasks in the relocation.

In addition, at the start of the PD relocation, the content of the communication was experienced misleading what the reality corresponded at the end. If the time spent could be used more efficiently in the beginning, the knowledge sharing activities reach more adaptive result and outcome. Secondly, there was more information needed when the relocation of work was destined to be started. As the sending side Interviewee E emphasized:

> *"There was un-clarity to which direction should receiving side start to do the work".*

This comment illustrates that communication between the relocation sides needs improvement. Misunderstanding in the relocation communication can be, however, explained in a certain extent due to differences in the expectation.

(C) Documentation challenges

The challenge in documentation was raised by interviewees indicating that the level of test documentation and reports were not in acceptable level after the relocation of competence and skills. As Interviewee 6A pointed as for the variety of the documentations:

> "*We got sometimes very implicit documentation or task description. But some times we had very rogue documentation and explicit what was also obsolete. Overall it could be improved".*

In the relocation procedures the task specific *backlog of user stories* is one of the primary components. The user stories are descriptions from set of requirements and explain the tasks of the relocation for user. It is also communication and visibility tool for other departments internally. As the interviewees explained that the backlog was not clear and did not explain the complete story of the tasks at hand. As Interviewee 7A argued about the shortcoming of the backlog:

> *"There is no backlog which consists of all the items, including all the small tasks. In this relocation they are collected on the fly when the takeover is happening."*

This comment demonstrates that the acceptance criteria and exit criterion of the user stories should be explained in more detailed and not on "gut feeling". In some cases, it can be measured if the documentation is able to be created by the receiving side; receiving side is not in a need of support or questions are raised during the area specific document preparation and it is approved without exceptions by the sending side.

In addition, the update cycle of the backlog was degrading due to the fact that the relocation driver left; after there was no view available of the current ongoing of the relocation. The update cycle was halted in search of the new relocation leader. After, when the position was filled it took some time to recover the cycle because the new relocation leader was unexperienced.

(D) Quality challenges

The findings in this section, and the main challenges surfaced from the analysis, on the example of the three PD relocation cases, point to the quality challenges. The quality challenges should be emphasized and not underestimated because they tie together the major concerns which influence to the quality of the PD relocation process. In relation to the quality concern, Interviewee E. said:

> *"When PD relocation started in our Release Area – it was thought to be over in couple of months. However, receiving side did not have what was needed to use directly. It took time to adapt to new."*

It was also pointed out that receiving side did experimenting work at same time, in the middle of the relocation process. For these reasons, sending side had to take over the daily work to secure the quality in the product development life cycle even they had relocated the work in their knowledge. The challenges in the quality of the PD relocation can be very harmful which derail the product development cycle and also have impact to the overall quality of the product development.

On a more general level, it is generally unknown how PD relocation process keeps the level of quality constant and what actual execution of relocation from quality perspective is. Therefore, the findings from the relocation examples are considered as quality concern overall. The improvement for the process should be generated from the quality management perspective. Therefore, quality management is selected as the key focus for the second, more detailed round, of the current state analysis

3.5.3 Quality Management during the Ongoing PD Relocation

This sub-section analyzes the steps and tools discovered in the ongoing relocation for ensuring and visualizing the quality by all product development Release Areas. The findings of the tools and steps are grouped and presented below by their name, and described by their definition and function. They are made from the data related to the three release areas A, B and C.

First, it was found that for the ongoing PD relocation, there are no indicators or quantitative formalities presently used, besides e-mails and weekly meetings. In the weekly meetings that were held, the current state of the relocation was reported and issues over the relocation were discussed. Second, there are neither proactive guidelines nor qualitative formalities used for securing the quality in the PD relocation. However, there are some quantitative and qualitative tools used for indicating how the product quality is secured during the current PD. Table 11 below describes these aggregative tools which display the quality characteristics of the current PD.

Table 11. Tools and Metrics for sharing quality characteristics used by the PD Release Areas.

#	Name of the Tool	Definition	Function	Deployed by
1.1	**Customer fault ticket chart of the product**	- Faults slip through - Unanswered fault tickets - Fault ticket lead time in product development	Trend of the Customer fault ticket compilation	All Release areas
1.2	**All open fault ticket chart of the product**	- Weekly in/out flow - Per release track - Per software package	Trend of the product development fault ticket compilation	All Release areas
1.3	**Product release assessment**	Release assessment per product release track (a checklist)	Assure end-to-end for product development release delivery	All Release Areas

As seen from Table 11, the tools of quality characteristics include the three tools commonly used for showing the actual product quality from customer complaints and found faults from research and development area. The checklist for the product delivery shares the overall information what is the product condition prior the delivery to customer. These quality characteristics are used by all Release Areas.

First, Tool 1.1 reveals the case company customer reported fault tickets, compiled altogether and expressed in a time lined chart for overall amount and trend. Secondly, Tool 1.2 reveals the product development reported fault tickets, compiled also altogether and expressed in a chart for overall amount and trend in timeline. Finally, Tool 1.3 is a midterm evaluation tool which assesses the product for the possible customer release and brings forth the results for deciding is the release action possible.

Additionally, the case company utilizes several internal tools for stating and highlighting the product quality to the entire product development community in the case company. These tools also reflect their information to the quality characteristics Tools and Metrics, and are utilized by all Release Areas. The most used such tools are listed in the Table 12 below.

Table 12. General quality statement for Tools and Metrics used by the PD Release Areas.

#	Name of the Tool	Definition	Function	Deployed by
2.1	**The Release Area radiator tool**	A quality statement tool for highlighting the developed product condition during the product development process.	Interactive tool for triggering required actions to prevent delay in product development.	All Release Areas
2.2	**MHWeb**	Integrated tool in intranet for collective fault reporting database across the product development and cross functional teams.	Fault reports both from customer and across development release areas	All Release Areas
2.3	**Wiki**	A web page allowing product development community communication	Presents the intra- organizational information channel for all detailed information for any area of interest.	All Release Areas
2.4	**JIRA**	A web page descriptive tool for creating tasks or reporting faults to cross functional teams in the product development	Collective task and function request database across the product development and cross functional teams	All Release Areas

In Table 12, the Release Area radiator, Tool 2.1, indicates the current quality status of the product software quality on node level per Release area in the PD process. The purpose is to constantly evaluate if the product SW is releasable. It creates awareness on serious faults that are not acceptable in the product release. In product development, troubleshooting and repairing the fault take significant time. Hence, Radiator tool helps to trigger required actions in time to prevent delay of the relocated product releases. The Release Area and system verification feedback loop tool highlights the entire executed product development acceptance test results and current state.

Tool 2.2, MHWeb database, is a collective database for all product development Release Areas fault reports and their corrective actions. It shows the fault report priority, volume per product SW package, inflow/outflow volume and customer initiated fault reports compared on yearly average. Tool 2.3, product development Wiki page, is a collective source for all sort of product development explicit information. It also cross-links all the required data together. Finally, JIRA, Tool 2.4, is a database where all the findings and task requests are reported. Based on the generated JIRA ticket number, the tasks or faults are investigated by the designated cross-functional team and corrective actions are executed and reported for feedback.

Summarizing the Actions, Tools and Metrics used in the ongoing PD relocation, they are shared and utilized internally in the case company by all PD Release Areas to follow up the quality from the quality management perspective. During the current product development cycle, the steps are experienced by the release areas as efficient for securing the quality. In order to reach high quality, processes and methods of produced SW deliveries are tested continuously and shortcomings removed. However, currently all the steps to secure quality lie within each separate release area. It leads to the necessary flexibility but also gives certain specifics and diversity to the quality management process.

As discussed, there are twelve PD Release Areas altogether. Each of the Release Areas has diversity of activities and methods for producing results in the product development cycle. In addition, each Release Areas secures quality not only by common Actions, Tools and Metrics, but also by other diverse steps. These diverse steps are mainly synchronized and transparent for all PD Release Areas around the product development. The steps are learnt, to a large extent, through common activities and are displayed in the company *Wiki pages, internal documents* and *by cooperation* between the PD Release Areas. Since the quality of the PD must not be compromised during the actual PD relocation (as discussed in section 3.2), therefore, the *Quality management* should make an integral part of PD relocation.

3.5.4 Findings from Quality Management in the Ongoing PD Relocation

The analysis of the current relocation process has shown that the 12 PD Release Areas have been successful in relocating their area functions.

As relates to the quality management in general, the magnitude of the PD relocation process (Transformation; case company strategy 2014) was felt by mostly at the sending side, as turmoil and subsequent turnover related to quality steps. For example, in the ongoing PD relocation process, there were examples of quality related efforts when automation caused some difficulties during the relocation of the daily work activities. It was felt that automation helps in daily work, but the real work in most cases is the things hidden behind the automation. To approach quality, it was, first, needed to get the understanding of the Release area work *(actions)*, and only after think how to automate it. It was also emphasized, when something does not work in automation for the first time, the daily cycle of PD will stop. Therefore, the conclusion from the CSA also was that the PD lifecycle had to be also taken into account before starting to manage quality in PD relocation. However, in this case the product is already quite mature and mostly in the maintenance mode by then. Hence, the skills and competence transition was not that much needed at some Release areas, and the receiving side could mostly pick up the work by looking at what was done on daily bases. While other release areas specifically asked for training in daily *Actions* before any daily work could be even started.

The CSA also shown that the Release areas also made some more specific steps to control and ensure *quality,* beyond *Actions*. It is customary that the Release Areas focus on customer perceived quality in the product and make sure that it exists. Consequently, the quality of the actual PD process is tracked continuously by the Release areas by using *Tools and Metrics*. In normal situations (outside of PD relocation), the company commitment to quality is demonstrated and secured through a system of controls. The system of controls, which can be related as *Actions* supported by the relevant *Tools and Metrics*, is shown in Table 13 below.

Table 13. Steps to secure quality in all businesses in the case company (Company Operational Quality Manual 2014: 7).

#	Steps to control quality
1.	• Providing products, services and solutions that satisfy customer expectations.
2.	• Operating effective and efficient processes aligned with vision and strategies.

3.	• Releasing the full potential of our global workforce through leadership and inspiration.
4.	• Fostering a work culture dedicated to customer satisfaction.
5.	• Securing compliance with relevant external standards.
6.	• Systematically reviewing and improving the quality of our products, services, solutions and operations.

As seen in Table 13, the case company guides the quality efforts for ensuring its operations, on a general level. The case company points to various aspects of quality and demonstrates how they are integrated in daily work, so that each employee - ideally - should be aware of the essential steps to achieve high quality levels. In addition, the case company currently has general quality guidelines that are promoted through communication, management commitment, defined responsibility and backing the implementation by selected practices. Table 14 below presents, on a high level, the quality criteria for the PD daily actions used in the case company.

Table 14. Quality guidelines for daily work in the case company (used for a case company test report of the PD).

#	**Quality criteria set for PD**
1.	• The products media plane quality fulfills the expectations, has acceptable characteristics and service performance.
2.	• All required product upgrade paths are working.
3.	• Stability is confirmed for all the product release packages.
4.	• All the applicable product traffic cases operate successfully.
5.	• Possible exemption in the product quality is indicated in the release report.

As seen in Table 14, all the presented points above relate to checking the product quality status and required to be on the level where the product performs acceptable and in full working condition. Thus, the current PD focus is found to be placed on quality, and it is achieved by continuous improvements, based on the PD performance measurements which secure effective process flows aimed at high level quality performance.

Overall, the quality aspects are highly emphasized in the case company for securing the reliability of the products and services in the product development.

Prior and *after* the ongoing PD relocation, all the quality securing activities (actions, tools and metrics, and social ties) are typically quite *common,* in their core, in all PD Release Areas. However, there are also some activities which belong specifically to each separate PD Release area. This difference can be explained as the necessary flexibility of the quality management process, specific for each area. At the same time, all PD twelve Release Areas have some common (in addition to proprietary) steps for securing quality. Therefore, these common steps can be generalized and synchronized for outlining the PD relocation status of all PD responsible parties, with the proprietary steps staying as Release area specific. The latter ones are developed or chosen on the basis of their ability to meet specific requirements and expectations. Yet, most of the release areas have *common* steps to secure quality by (a) actions, (b) tools and metrics, and (c) social ties, which make the common quality management possible in the PD relocation process.

3.6 Summary of Strengths and Challenges

This section summarizes the current state analysis and refers to the main findings in this section. This analysis was performed by interviewing, observing and studying the internal documentation of the Release areas. The quality related activities, used tools and metrics, and social ties of the employees in their daily work were investigated for understanding the complete PD cycle of the product in the sending side of the relocation.

The analysis of the case company brought up several significant findings. They indicate that practices in the current PD relocation have strengths and challenges. The strengths and challenges in the current relocation are intensified in the following table 15.

Table 15. Summary of the Strengths and Challenges of the current state of PD relocation.

Challenges	Strengths
A. Capability, competence and resource challenges: • Shortage of capability, competence and resource shortage at receiving side **B. Communication challenges** • Breakdowns in review communication. • Misleading communication in the beginning of the relocation process. **C. Documentation** • Variety of ambiguous and rogue documentation. • Content of backlog user stories shallow. **D. Quality challenges** • Deficient handling of quality in the PD relocation. • Daily work recalled for securing the quality of the product development life cycle.	**1. Relocation time line** • Dynamical and adjustable • Experienced as more trustworthy approach. **2. Contributing relationship** • Continuous availability and commitment for sharing competence and skills. • Feel of working together for common goal. **3. Relocation alignment** • Adequate relocation steering, orchestration and management.

As shown in Table 15, the main challenges of the ongoing PD relocation can be intensified into four main categories; A) Capability, competence and resource, B) Communication, C) Documentation, and E) Quality.

However, even when pointing to common needs for improvement, it should also be taken into account that the PD relocation tasks vary in many ways, such as in the area complexity, size and coordination. That puts additional restrictions on the interpretation of the strengths and challenges in the PD relocation process. Evidently, more complex areas require broader management and resourcing, while some need to focus more on tighter administration and quality management. In consequence, this requires a selec-

tive application of possible common quality improvements, since impact from unnecessary classification and meaningless procedures would then only hinder the normal PD functions.

Thus, when pointing to the main topic of this study (ensuring quality in the PD is relocation), the found main challenges in the current PD relocation process should be approached flexibly.

The key finding from the current state is: At the moment, the process lacks straightforward and alienable procedure where *Quality management* can be adjusted and aligned to *the Ongoing PD relocation process*. This challenge is selected to be solved in this study. Table 16 below points to the selected area for improvement among the main challenges identified in the current state analysis.

Table 16. The improvement requirement emerged from the challenges of the current state of PD relocation.

Challenges	Selected for improvement
A. Capability, competence and resource challenges: • Shortage of capability, competence and resource shortage at receiving side **B. Communication challenges** • Breakdowns in review communication. • Misleading communication in the beginning of the relocation process. **C. Documentation** • Variety of ambiguous and rogue documentation. • Content of backlog user stories shallow. **D. Quality challenges** • Deficient handling of quality in PD relocation. • Daily work recalled for securing the quality of the product development life cycle.	**Quality management improvement** • A Quality Management Framework to support the ongoing PD relocation process.

As seen in Table 16, the findings from current state analysis suggest that the current PD relocation process would need an improvement related to Quality management, as either approach, or framework, or ideally a process. This will be specified later in the

Proposal building stage (Section 5), since it requires suggestions for quality management from a practical perspective. Quality management is chosen due to its utmost importance, compared to the other described challenges, which also appear as more instrumental for supporting the ongoing PD relocations.

As for the *quality* related findings, the quality management in product development was analyzed and the steps structured into three categories: a) Actions, b) Tools and Metrics, and c) Social ties. As discussed earlier in this study, the researcher has selected this approach to quality management based on the analysis of both, *normal PD tasks* and *the relocation* perspective. Table 17 below presents the summary of required quality management improvement in PD relocation, and the areas for improvement in more detailed.

Table 17. Summary of the focus area selected for quality management improvement.

Selected focus for improvement	**Zoomed into:** Quality management areas for detailed improvement (based on: normal PD tasks + the relocation perspective)
Proposing a Quality Management Framework to support the ongoing PD relocation process.	**1. Actions**: the Release area procedures and responsibilities in the PD relocation process.
	2. Tools/Metrics: the utilized tools and the knowledge behind for PD in the Release Area(s) in the PD relocation process.
	3. Social ties: the interactions and social connections among personnel for sharing information, knowledge, and experiences in the PD relocation process.

Based on the quality management challenges discussed earlier in this section, the next section examines the best practice and available knowledge in quality management, which should address the challenges in quality management in the PD relocation.

4 Best Practice of Ensuring Quality in PD Relocations

This section discusses the best practice and available knowledge for managing the PD relocation process. The resemblance of PD relocation to offshoring is evident in the publications. Therefore offshoring will be briefly discussed on the examples of major relocation cases of product development. Thirdly, quality management is discussed, with a special attention to the quality management in order to understand its significance in PD relocation. Finally, the conceptual framework from the above findings is constructed for approaching challenges of this study.

4.1 Offshoring in Knowledge Intensive Industries

Offshoring is often defined as an act of relocation of the company's processes or services to another country (Business Dictionary). In other words, offshoring is a procedure where a company business process is relocated from an onshore to a foreign destination. There are also variations in definitions of offshoring. Offshoring sometimes refers to activities which are performed in-house, but in foreign locations (Pyndt 2006: 12). It stresses that offshore must take place into a different country than the original company's location. Dominguez (2006:6) explains that even if the business process is executed in a different country, it can still be carried out by the same company instead of an offshore location. In another example, *outsourcing* refers to the relocation of processes to external providers irrespective of the provider's location, whereas *offshoring* refers to the relocation of processes to any foreign country, regardless of whether the provider is external or affiliated with the firm (Nassimbeni 2011:406). Sometimes, *sourcing* is offered as a more general perspective for explaining these terms. Sourcing is an arrangement by which the work can be nominated to internal or external body physically located anywhere (Oshri 2015:7).

As seen from these examples, the terms used by various authors can be quite different. The difference in terms outsourcing and offshoring to different locations is illustrated in in Figure 11 below:

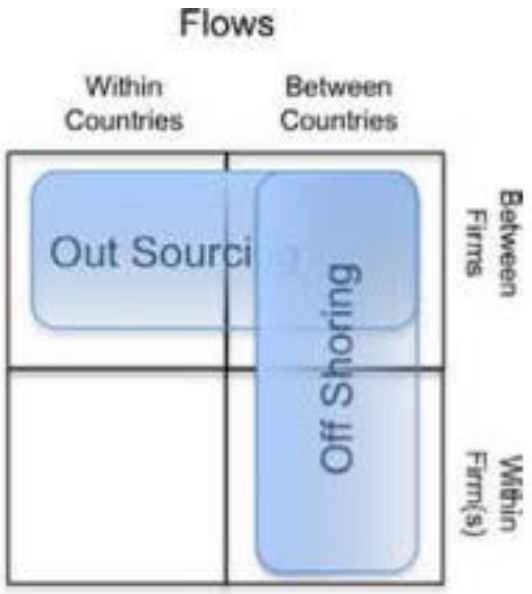


Figure 11. Sourcing alternatives.

As seen in Figure 11, the locations differ between the flow of the sourcing activity depending on the location of country and company. Even if terms have difference in meaning, the purpose is apparently to point to the context of change. Presently, the actors involved in offshoring/outsourcing are more and more often come from various knowledge intensive industries, and relocations there have their strong specifics.

Knowledge intensive industries are preliminary defined as organizations that offer to the market the use of highly-sophisticated knowledge or knowledge-based products (Alvesson el al. 2004: 17). It is typically a research and development cost-based company where most of the employees have academic education and work in knowledge intensive jobs by using their intellectual skills and competences. The key difference, that is argued to distinguish *a knowledge intensive company*, is the reliance on human capital as opposed to physical capital (Swart 2003:62). It is also the way how the human capital is applied in the company. To gain in human capital in product development area, for example, implies the application of tacit knowledge for incremental build up in knowledge-intensive companies. This considerable presence of tacit knowledge makes a significant part of human capital in knowledge intensive companies. In addition, tacit knowledge can be of different types, such as s technical; as individually prelearned and utilized knowledge, or practiced based. It takes a long time to develop and encompasses also the culture of the company. Both tacit and explicit knowledge that employees operate within knowledge intensive industries make any relocations, or offshoring/outsourcing, extremely challenging for such companies.

(A) Motivation to offshore for Knowledge Intensive Industries

Offshoring for knowledge intensive industries has currently become a frequent phenomenon, used by such industries as IT for several years already. The strategy to offshore some company functions have obviously amplified and its pace increased. Globally, the offshoring of IT has been increasing more rapidly than in other industries, due to fast technological development (Pyndt 2006: 9). As a result, offshoring has stopped being tight to space nor equipment anymore. Companies have various motivations for offshoring, with the main purpose being the strategic reasons of lowering the overhead and unit costs, and eventually increase competiveness of the company. In the long term, staffing management, work culture, overall quality and productivity in offshore location have become better with the time. Business practice suggests that, with the time, the company productivity will also gain, since value activities improve followed by increase in profitability. There is evidence (Lewis 2006: 23) that offshoring reduces direct operating costs, at least partly from the total IT operation costs. This is seen as most convincing motivation than any other benefit. Dunning (1998: 53) identified four general reasons behind the motivation to offshore that have not changed much since the older times. They main reasons to offshore are illustrated in Figure 12 below.

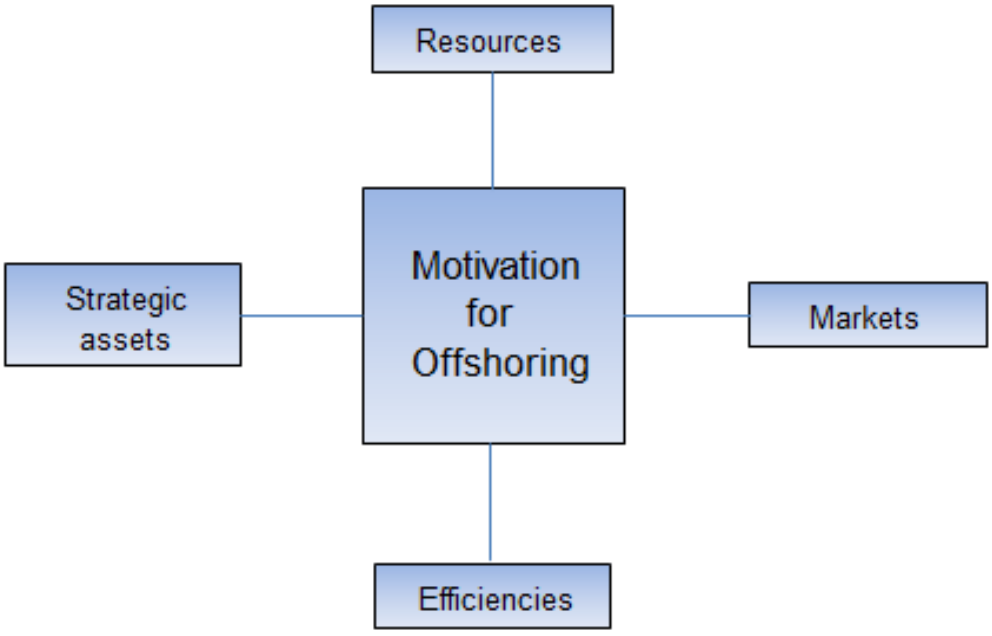


Figure 12. Four general motivations for offshoring (Dunning 1998:53).

In Figure 12, first the resource-seeking company pursues resources of foreign labour for reducing its own costs. Secondly, a market-seeking company aims to reach local markets, and also find foreign suppliers, institutional competence and scarce talent for the support and improvement of services and products from the corresponding loca-

tion. Thirdly, efficiency-seeking company pursues locations where economic obstacles are facilitated by regulators. One example is the countries that have attractive tax advantages and immigration laws. Finally, a strategic asset-seeking company strives for enhancing its own assets and tackling the competition by heading to the foreign markets (Dunning 1998:53). As seen from this illustration, offshoring is seen as a possible remedy to quickly scale operations and better fit the changing market demands.

(B) Challenges in Offshoring Knowledge Intensive Industries

Even if offshoring seems to be promising for knowledge intensive industries and has many attractive aspects, there are also various challenges. First of all, companies make their own mistakes by not spending enough time for evaluating which of their processes should be offshored and which not. Most of the companies have difficulty in making distinction between the core processes and business critical processes (Aron, Singh 2005:135). The risk of making wrong decision might end up in devastating strategic choice. Here, the ranking of company processes for candidates and prioritizing them creates the possibility which processes should go offshore and which not (Oshri 2011:54-55).

Another major challenge which companies may encounter in offshoring their product development operations is the structural risks (Oshri 2011:54-55). A structural risk to predict in product development relocation is challenging due to the difficulty of creating accurate quality metric or monitoring its outcome. Such risk may also surface when the offshore location does not hire qualified personnel, provide training or perform certain required work. However, when the offshore provider does not deliver expected standard the ability to evaluate such structural risks is to monitor work by qualitative metrics (Jahns 2006: 9).

In addition to the operating risks, from the people perspective, many companies have failed to realize that offshoring has always an emotional impact on employees. The employees might become the loudest challenge that the offshoring process brings in (Oshri 2011:169). Many persons go through emotional turmoil more than once during an offshore process. To mitigate this impact, companies typically offer personal counseling and financial planning for the employees under change.

Summing up, offshoring has different meanings pointing to various perspectives of relocating the knowledge intensive work. Although different, offshoring has some common motivations and challenges for doing it. Offshoring from knowledge intensive

companies will be still increasing in the future. The decisions for offshoring need to be done on strategic level, well-planned and taking into account multiple perspectives.

4.2 Project Management and Managing Major Relocations Projects in PD

Knowledge intensive industries often rely on project-based way of working, with knowledge intensive deliveries which are often very complex. Therefore the deliveries are broken into smaller pieces (projects) for managing them. Project management aids knowledge intensive industries to manage correctly these pieces by setting them in stages in a project, and creating and maintain appropriate project structures. A popular guide for project management is the Project management Body of Knowledge (PMBOK Guide). It is a framework containing extensive guidelines for project management, which aims to ensure that the project targets are met. The PMBOK is a standardized framework applied in the project management field. It is intended to be compatible with International Organization of Standardization (ISO). PMBOK defines Project management as

> *application of functions, knowledge, skills, tools and techniques for project activities to meet and exceed the project requirements (PMBOK 2013: 6).*

The basic project management consists of processes and their sub-processes. Each of these processes requires number of stages that are progressed through in sequence. The stages typically are: a) Initiating, b) planning, c) executing d) controlling, and e) closing the project (PMBOK 2013: 5). Each stage includes preparation and approval before proceeding to the next stage. In case of unpredictable changes during the process, iteration is required to handle these changes. In summary, project management and PMBOK best practice establish a general framework for delivering projects by pointing to the beginning and end of a project, its processes and sub-processes. In the middle, the projects are divided by various kinds of targets and planned tasks. One of the project types is a relocation project. Being a challenging project, especially for knowledge intensive industries, a successful relocation project requires an effective project management, with considerable attention to quality management.

Relocation is defined as a change in the physical location of a business (Business Dictionary). As discussed earlier, relocation is bound to the context of offshoring. Equipment, systems, and facilities can be relocated, including operational knowledge and experience. Any offshoring involves relocation – it is in the context of both manufacturing and knowledge intensive industries relocation. However, relocation is more com-

plex for the knowledge intensive industries compared to manufacturing. Manufacturing relocation is a product oriented strategic decision that manages mostly tangible, physical assets such as objects created by materials. Whereas in knowledge intensive industries, relocation manages intangible, invisible assets such as skills, competences, knowledge and other resources, such as tools in the PD. Therefore, the sending side of relocation must have high degree of visibility of receiving side capabilities, and understanding of the receiving side culture and experience (Vashistha et al. 2006:158). Based on this, the sending side can be aware of the receiving side capabilities, and therefore decide whether the PD can be put forward strategically with the receiving side organization.

One of the examples of relocations in the knowledge intensive functions is relocation of PD. PD responsibility of a knowledge intensive product means obligation to high standards. The PD team must be aware of the standard quality requirements how they apply with the particular project and how they are aligned with the customer expectations. Understanding and establishing quality requirement is a key planning step for any project management.

Before quality management in relocations can be discussed, relocation as a project and as a process needs to be further discussed.

4.2.1 Process of Relocation

Relocation is a general procedure where business process is transitioned from one country to another. Thus, the relocation process, its time line and tracking need to be planned carefully. In the literature, relocation is often tight in transitioning of issues to offshore. Vashistha et al. (2006:183) state that “each transition requires customization depending on the type of work, work-flow model, the rate of transitioning resources, and the level of work and information division between onsite and offshore.” The requirements and concerns become more obvious after the decision to relocate. The relocation process usually occurs simultaneously with the business life cycle. The receiving side of the relocation has not yet grown to the level of adequate matureness of the sending side, even they have the resources and IT capabilities. Therefore, the receiving side must optimize itself to the sending side extraordinary processes which usually are complex and divergent.

The transition processes are unique and therefore need a concrete management and control of execution. Ideally, some enablers could be presented such as artifacts for

mitigating relocation process; technical enablers, measurement enablers and social enablers; these artifacts-enablers deliver the means for relocating work across inter-organizational borders. An example of transition process steps is shown in Figure 13 below.

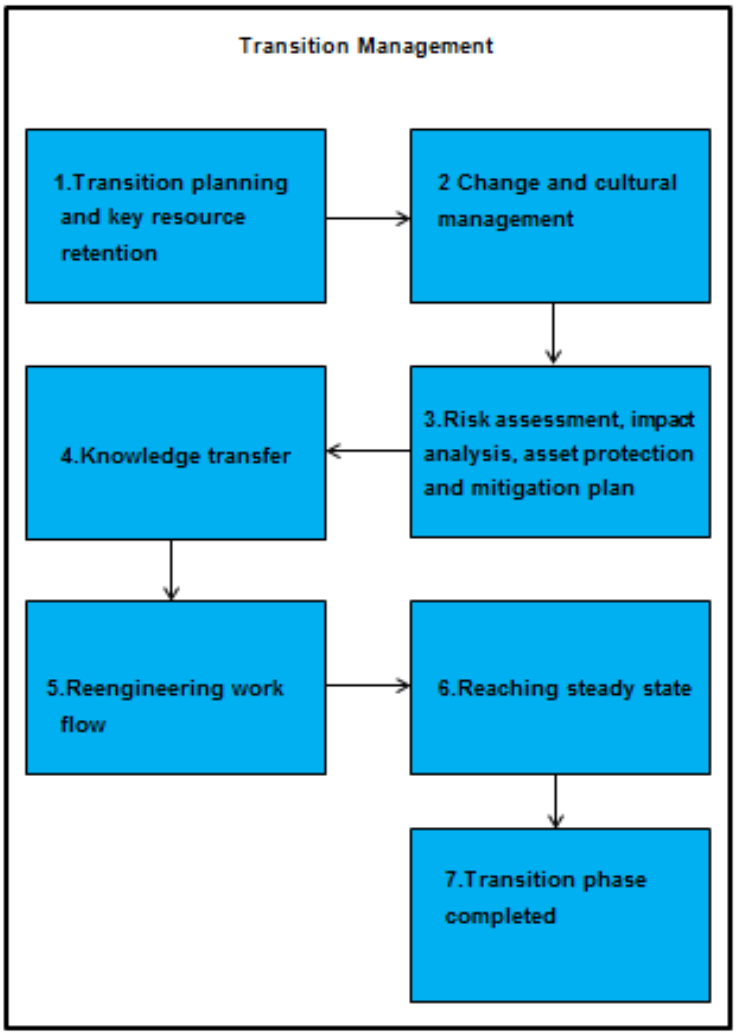


Figure 13. Example of transition management process (Vashistha et al.2006:183).

In Figure 13, the planning of the steps towards the desired state of the offshore is started already before the transition agreement is signed. The receiving side of the relocation has fewer employees for pulling the work. Therefore the number and length of the transition stages must be extent. The planning of the amount of resources to be transitioned, transition management, transition time lines, need for local representative, training locals and documenting the process need to be investigated carefully. The risk of failure is high in the transition due to dense technology and social communities involved to the transition phase. For this reason, the transition risks and impacts can be mitigated by an experienced expert, who has received experience from previous transition engagements. (Vashistha et al.2006:184) describes that the expert should design a detailed map for the transition which include several stages, a process for document-

ing the transition, knowledge transfer training and training program which include both shadowing and reverse shadowing. An assigned expert may foresee the challenge in the transition and make necessary changes before the challenge becomes irreversible.

Summing up, the best practices of transition projects in offshore context show the important roles of transition management. All of the processes are needed to be constantly improved due to changing requirements in the offshoring context. However complex any relocation project can be, product development relocation in knowledge intensive industries involves even more complex issues related to intangible, invisible assets that need to be constantly developed. Therefore, challenges will arise which are related to the transition phase, the actual relocation of activities and various quality related issues. Two examples below coming from major relocation projects demonstrate the level of complexity in such projects.

4.2.2 Challenges in Major Relocations of PD

The management of major product development relocations does not come without consequences. The observations and lessons learned from two example case studies from literature are presented next.

(A) First case example

In this case, a major Swedish multinational company was relocating its previously acquired Component development to its subsidiary in India (Šmite 2006: 306-311). The Swedish company had main PD of the component and the plan was to relocate it due to strategic decisions; assuring penetration to other market locations and cost savings. The relocation process was planned on top of relative compact time schedule. After the decision to relocate, the resources at the receiving side of the relocation was started to be looked at. Despite all activities, there was difficulty to recruit key personnel to business critical positions. Even if flexible resources for recruitment India is vast. It was acknowledged that finding absolute replacement for the relocated tasks is tough. It is recommendable to recruit before the relocation is started or promote existing employees to core team functions. The focus in the core team key roles is mandatory because the work cannot anyway be relocated completely or train people to cover everything.

When the resources were settled, next the competence and skills relocation took place; the experienced personnel at sending side moved their skills and knowledge to less experienced personnel at receiving side. The challenge lied in moving the previous experience and tacit knowledge. It is not cost effective to relocate experts from the

sending side with the product for fixed time for supporting the unexperienced personnel at the receiving side. It is more efficient to engage with the receiving side by planned practical hands-on training; the daily work is the most practical way to keep quality prior and after the relocation. Also the requirement was to gradually proceed with the competence and skills moving to ensure the quality and minimize the negative impact of the PD prior and after the relocation. In addition, the emphasis should be also on comprehensive documentation for securing the product development assurance and maintainability.

The quality of the daily product development at the turmoil of relocation process was affected. At the same time the resources of the product development at sending side was focusing to trainings and knowledge relocation for the receiving side. To ensure the continuum of efficient product development and keep customer satisfaction, the sending side decided to moderate the speed of the product development cycle in order it to be in balance with the concurrent relocation process.

At that time, the relocation was finalized and the sending side ramp down their relocation resources for other tasks. However, at the same there usually is a risk for uncertainty and need of support at sending side for taking over the product development completely. To solve this, one thing could be to introduce a probationary period, where the receiving side has the complete PD and sending side is only supporting by coaching and mentoring for fixed time.

At that time, the cultural differences were also emphasized because there were falsely understood expectations of the content and direction of the actual relocation by the receiving side which delayed the relocation process. For collaboration and cultural awareness, cross cultural training and dialogue is established as mandatory practice for employees working at the relocation process.

The relocation was measured by its costs and timeline of the process. No measurements were recorded from the relocation itself. The only one was that the relocation did not have effect on the actual product development. However, during the relocation the quality of the product development was challenging to capture because the cycle of the development had been intentionally moderated to fit with the relocation process. The actual product development quality can be only evaluated after some time when the receiving side has done product development in full responsibility.

In summary, this example introduced relocating product development and revealed practical challenges when relocating product development between countries. Additionally, the example presented recommendations; it is overall demonstrated that effective planning and management is key factor for success in managing relocation projects.

(B) Second case example

In this case, an onshore SW product development company in US planned to offshore the development of one of their business critical processing engines front-end development to offshore company which develops SW products and provides SW development services (Kussmaul et al. 2004:147-154). The offshoring of product development was executed due to various reasons. The top most reason was resource shortage of architects and cash flow savings because the onshore company was already supporting significant product development effort.

The project started by the offshore consultant working and studying the onshore company domain for hourly base in the onshore company. At the end, the consultant provided proof- of-concept and a demo. Based on the outcome, the onshore company decided to outsource its front-end development to the offshore company. At the start of the transition, agile approach was decided to be used as activity for transit the product architecture and feature to be used (a product backlog was developed). The onshore personnel sign the required milestones, features, working time and cost range to the backlog. After this, the offshore team decides the scope and time when the work is completed.

Both onshore and offshore team use shared mailing list for communication where status of the product is distributed and problems/questions are discussed. In addition, short daily meetings kept for reviews and central database is utilized bilaterally by both teams for keeping the code in working order all the time. The top priority of the onshore team is to solve all the problems that are discussed in the daily meetings. Offshore team focuses on low-level design and associated documentation. The key element is considered to be the efficient, continuous collaboration between the onshore and offshore teams.

In summary, this offshoring case produced some lessons learned for which the most important findings are described. Frequent and early delivery of working SW allows time to review and make required changes for which then builds confidence among

both side of the teams (not worked before together) and builds up efficient communication between all the participants. It is emphasized that effective *communication* should be built up early. Such as in example, an on-line and off-line communication method such as on-line chats and email. It facilitates the both team interworking in product development towards the common goal.

These examples demonstrated two product development relocation cases from knowledge intensive industries and their learned key lessons. The key lessons emphasized the challenges for organizations in relocations to outsourcing or offshoring destinations. The findings from both examples, however, ended up not discussing the challenges of quality management. They do not suggest any recommendations to be considered for quality management to support the ongoing PD relocations; nor identify any actions, tools/metrics or other steps quality management in relocation. Thus, no quality management aspects are discussed though it is an obvious matter in any offshoring case that should be taken in to account. This send a strong signal that the issue of *quality* apparently is not yet investigated enough. Therefore it needs additional efforts to synthesize such an approach to quality management from a more general management field.

4.3 Quality and Quality Management in Projects

As described in the beginning of this study, quality is meeting the customer requirements. *Quality* is defined as the standard of something as measured against other things of a similar kind; the degree of excellence (Oxford dictionaries). Its nature and classification meet the properties what it is measured for. Humble et al describes that it is important to deliver *sufficient* quality to bring value to the users (Humble et al.2011: 12). By this way, the customer requirements are met by keeping the level of the quality in acceptable level.

Quality management is defined as a method to identify and reduce the opportunities for defects which cause reduction in the quality process outcomes (Business Dictionary). Quality management is also defined as one of the key elements in the organizations; quality management addresses methods and tools ensuring that the quality is kept constant. Its purpose is to make sure that the project meets the need for the reasons it was taken and initiated. Consequently, the process of quality management provides the means by which the process integration and deployment fits qualitatively throughout the offshoring, transition or relocation process. In product development, it is abso-

lutely beneficial action to secure a high level of quality, especially in the relocation context.

4.3.1 Quality Management in PD

On the example of IT as a knowledge intensive industry, Kannabiran (2011) noticed that meeting extensive quality requirements in offshoring engagements is a considerable challenge due to the very nature of development in SW. Quality management is one of the methods for eliminating inefficiencies in the SW development processes. Six key factors of driving quality in SW projects were identified and included in an offshoring quality management model. Figure 14 below illustrates the six drivers of software quality in the context of offshore SW development.

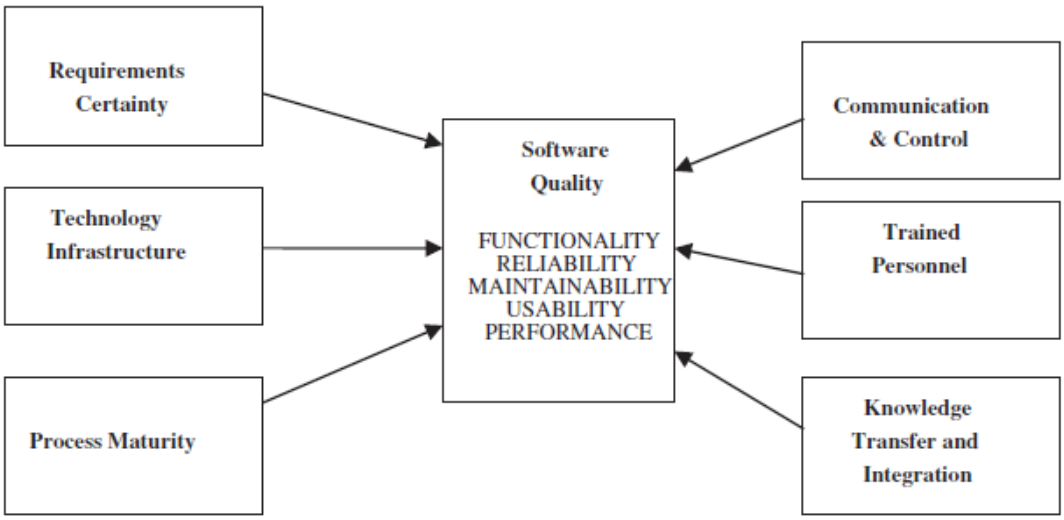


Figure 14. Six drivers of quality in the context of offshoring SW development (Kannabiran et al. 2011:1203).

Based on Figure 14, the six drivers for software quality and its associated attributes include: the requirements certainty, technology infrastructure, process maturity, communication & control, trained personnel, and knowledge transfer and integration. The software quality associated attributes are reliability, maintainability, usability and performance.

According to the results, the quality is impacted by *technology infrastructure*. The reliability of the software is met when the requirements focus on to use adequate tools and platforms. Most of the projects that are offshored are developed through extensive use of tools for process automation and reusable codes and therefore have direct impact on the reliability of the software.

In the study by Kannabiran et al., the *trained personnel* have significant relationship with the functionality of software quality in the offshore context. In the case of offshoring, trained personnel had a positive effect on software quality. Therefore, their availability is essential to be ensured throughout the development life cycle of software development.

It was also emphasized that good level of *communication* and their processes within both onshore and offshore, help to improve the usability of the software. Good communication assists on capturing the requirements properly and therefore ensures reliable software for the customers. However, culture and differences in time zone affect the decision making and reporting communication.

The *requirements certainty* also play a significant role, which refers to uncertain or unknown requirements which create disruption in the software development and therefore its quality thus its volume must be kept low. The nature of offshoring has restricted scope for repeated requirement validations, and therefore it affects all the attributes of software quality. Furthermore, if the goal is on the long-term usefulness of the software, the requirement certainty must be focused.

Finally, the *process maturity* defines the consistency and characteristics of software development processes. It has impact to the functionality, reliability and maintainability of the software quality. For sustaining success in process maturity will depend on constant tuning of the process to achieve the expected quality in the software development environments.

The case study suggests that by gaining business and technical knowledge, the organization can implement processes to achieve *knowledge transfer integration*, applied for software development. The approach of offshoring provides restricted time window for offshore team to understand the technical and business complexities. This have an effect to the functionality of the software and therefore, to its quality. Overall, the software quality and the importance of quality management systems in offshore site were adequate area for the study because it generally is a concern for the management in knowledge intensive industries.

Summing up, best practices of transition management process and software quality in offshore context identify and evaluate factors which influence the SW development quality on offshore sites. The important role of quality management in offshoring knowledge intensive industries is obviously emphasized in the need for all processes to

be constantly improved. The next section concentrates on the tools and means to exercise quality management in complex projects.

4.3.2 Quality Management in Complex Projects

The quality management process is best discussed by the PMBOK guide. It includes processes and activities which are intended for supporting the undertaken project. It aims to ensure that the project and product requirements are met within the context of the project. The PMBOK guide for quality management consists of three main areas as shown in Figure 15 below.

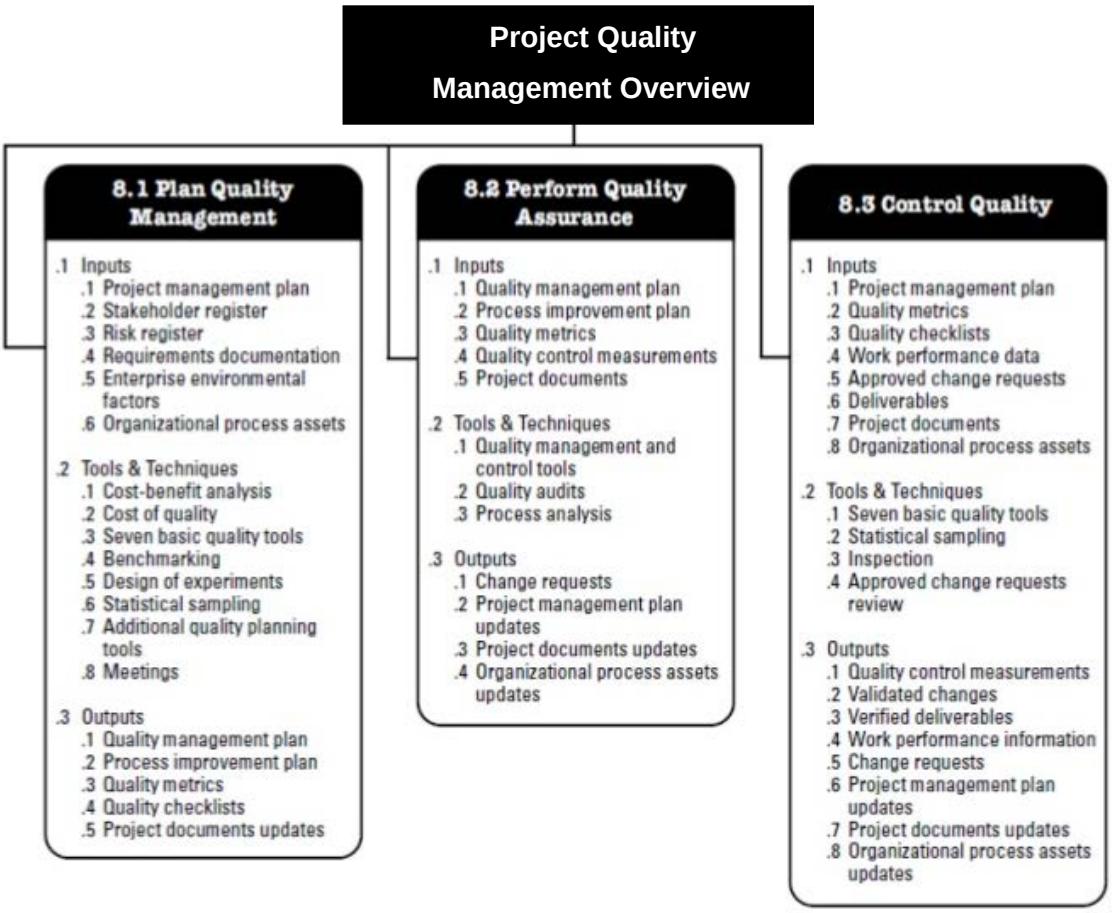


Figure 15. Project Management Quality overview (PMBOK guide 2013: 230).

As seen in Figure 15, PMBOK identifies the stages and their content related to the quality management. Each stage has descriptive input and output containing tools and techniques which are described as follows,

Plan Quality Management provides the overall plan to identify, organize and place the requirements for the project based on adherence of quality requirements (PMBOK guide 2013: 227). It also provides to definition of quality management actions and di-

rection how quality is managed in the project. Quality management planning can be executed at the same time as e.g. the project time line adjustment or planning cost processes. It can be reviewed once the information about the declining quality in the project is surfaced. In addition, by making the use of the information from key findings from previous relocations and passing that information to the quality management adds value for the company possible future relocations.

The Quality Assurance provides the activities that examine business processes to ensure that they maintain acceptable level of wanted quality. It audits the quality management planning process flaws and faults during the working process of integrating the project process. Basically it offers the protection for design, development, integration, testing and documentation quality which is established by the company quality standards (PMBOK guide 2013: 242-247). It contains all activities for ensuring that the quality system is implemented to support the projects performance and deliverables which are agreed with the relevant quality standard. The goal is to assure the by identifying possible risks, problems and preventing them before they arise.

Control Quality is set of activities that monitor the process of the project and produce measurements from the results. The activities should be utilized during the project planning, execution and closing stages for providing the collective tests and reviews for final acceptance criteria. The main goal is to ensure that the set criteria's and project deliverables stick to the agreed specifications (PMBOK guide 2013: 248-250). The project performance is monitored in order to support relevant quality requirements and gain satisfying results. The goal is to find the source of the errors and remove them.

Each of the PMBOK quality management stages has their defined standard models; the inputs are handled by respective tools/ techniques, which then provide the necessary outputs. These process specifications are consistent and focused on project level only. The three quality management stage processes have tangible items such as quality management and control *tools*, quality *metrics* and quality *checklists.*

Summing up, this section introduced best practice of quality management on the example of the overall QM approach, as well as particular tools, metrics and checklists suggested by the quality management (PMBOK) model. This example points to effective quality management practices for quality management as the key success factors for supporting quality in major relocation projects in knowledge intensive industries.

The findings from literature and best practices are merged into the conceptual framework in the next sub-section.

4.4 Building Conceptual Framework

Presently, many knowledge intensive companies relocate their knowledge intensive processes to another country due to various reasons. The top most reason is due to strategic decision where cost savings play an important role. In addition, it is always a requirement from the owners of the knowledge intensive processes to ensure that their relocated processes or products would meet the customer needs. Therefore, when the actual relocation occurs, the companies' ambition is to support the PD *quality* during and after the relocation process. Although discussed for settled processes, *quality in major relocation projects* have never been discussed in detail previously, especially for the knowledge intensive industries.

Quality has become an important factor for the survival and success of the companies. Hence, the emphasis on quality management has increased. Quality management is one of the key tenets for support success in the offshoring endeavours to another country. Knowledge intensive industries which have technological expertise and have developed their products and processes in one context for a substantial time have significant challenges when faced with the requirement to ensure quality, also during the relocation project itself. There is simply no reference to use for such cases, while businesses expect that complex processes can still be relocated to another country without major vulnerability. Here, one of the essential elements, as was shown on the example of knowledge intensive relocations, relates to quality management. Based on the existing knowledge, as well as the experience of the case company of this study, Quality management can be pursued from the perspective of supporting the *activities, tools, metrics* and also *social interactions* during the relocation process.

In this study, based on the findings from business and academic publications, the conceptual framework is built from the core ideas on supporting PD relocation coming from (a) project management and project quality management, (b) relocation process models and relocation case examples from major relocation, and (c) quality management in IT development projects. Consequently, the conceptual framework approach is summarized as shown in Figure 16 below.

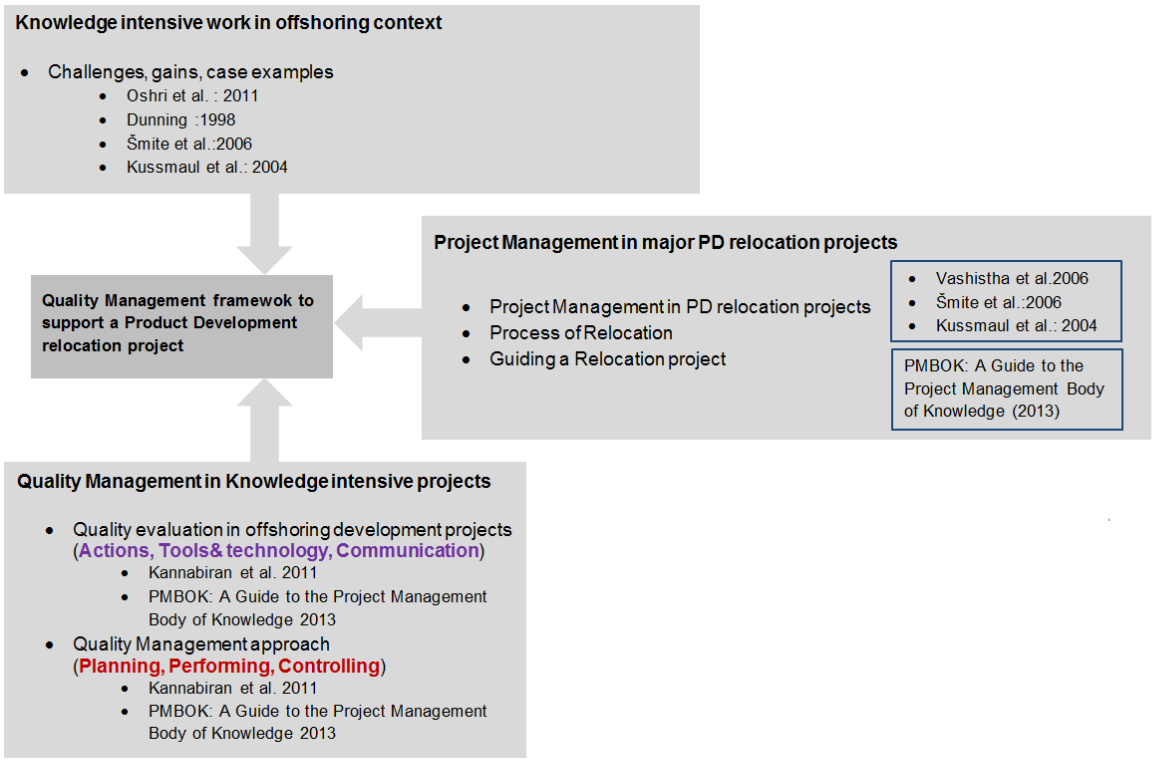


Figure 16. Conceptual framework for building Quality Management process.

This conceptual framework takes into account best practice for quality management and project management focused on exploring a possible approach to relocating the knowledge intensive work, but also includes suggestions from case examples and practices pointing to concreate actions, tools/technology, communication, planning, performing and controlling as ways to support PD relocation project when offshoring in knowledge intensive industries.

5 Proposal Building

This section presents the proposal for quality management approach for product development (PD) relocation in the case company. The section starts by describing the key findings from the current state of PD relocation and matches them to the related best practice found from literature. Secondly, the stakeholder suggestions for building the proposal are described. Finally, the initial proposal for quality management in PD relocation is presented.

5.1 Overview of the Current State Analysis (Data 1) and Best Practice

This section merges the results from the current state analysis of PD relocation (Section 3) and best practice found from literature, and presents a starting point for building an initial proposal for quality management based on them.

In the course of CSA (Section 3), semi-structured interviews, observations, internal documents were analysed and the main challenges were identified. In Section 4, the existing knowledge from literature was searched for creating the Quality Management Framework. During the current state analysis, the key finding was that, at the moment, the process lacks straightforward and alienable procedure where quality management can be adjusted and aligned to the ongoing PD relocation process. *This challenge was selected as the focus in this study.*

Based on the findings from current state analysis, the ongoing PD relocation process would need an improvement related to Quality management shaped as either an approach, or a framework, or a process. This will be specified below, during the Proposal building stage. As for the existing quality related activities performed by the Release areas currently, they were identified, analysed and structured as falling into three categories: 1) Actions, 2) Tools and metrics, and 3) Social ties. These activities made a good foundation for developing a QM Framework from this point onwards. Observations done in the CSA also revealed the strengths and weaknesses of these types of activities, from both the ongoing PD relocation and the quality management perspectives.

Table 18 below reminds of the focus area selected as a basis for a quality management proposal.

Table 18. Summary of the focus area selected for quality management improvement.

Selected focus for improvement	**Zoomed into:** Quality management areas for detailed improvement (based on: normal PD tasks + the relocation perspective)
A Quality Management Framework to support the ongoing PD relocation process.	**1. Actions**: the Release Area procedures and responsibilities in the PD relocation process.
	2. Tools/Metrics: the utilized tools and the knowledge behind for PD in the Release Area(s) in the PD relocation process.
	3. Social ties: the interactions and social connections among personnel for sharing information, knowledge, and experiences in the PD relocation process.

These and similar steps were later observed in Existing knowledge and studies and cases published on quality management. Therefore, the same logic of dividing the steps into: 1) *Actions,* 2) *Tools and metrics,* and 3) *Social ties* were preserved in the Conceptual framework. Based on this, best practice suggestions were searched for, according to this logic, blended into the Conceptual framework, and also applied for building the Proposal.

Thus, the Proposal below will focus on developing a *Quality* Management Framework for improving *the ongoing PD relocation process* as a Proposal in this study. This focus was formulated as an instrumental *framework* for managing quality in the PD relocation. This proposal addresses the challenges identified in the CSA, but at the same time retains its strengths. The proposal is built in a collaborative manner, together with the key stakeholders, and presented in Section 5 below.

5.2 Suggestions for Proposal Development (Data 2)

This section describes the discussions with the relevant stakeholders which were conducted for bringing up suggestions for proposal building regarding the current activities in the PD relocation.

The stakeholders for the discussion were selected from both sides of the current relocation. Data 2 was collected by interviewing the stakeholders in individual and group discussion. There was no formal questionnaire needed because the stakeholders had

detailed suggestions for each specific topic which brought up suggestions for improving the current PD relocation process. The suggestions were collected for building proposal. The following Table 19 sums up the suggestions provided by the stakeholders on each identified challenge.

Table 19. Suggestions (Data 2) for building proposal for the QM Framework to support the ongoing PD relocations. (Based on introducing CSA, CF and best practice to stakeholders).

#	**Best Practice , Conceptual Framework, and CSA => for Proposal**	**Stakeholder suggestions (summarized)**	**Description of suggestions**
1.	Project Management ⇨ logic of **stages** for the suggested QMF.	**Stages** and ranking different levels of **maturity** in the relocation.	The PD relocation Project Leader suggested that there should be some kind of stages and ranking designed for different levels of maturity (knowledge, tasks) for the relocation, and possibility to modify it accordingly for the future relocations.
2.	Process of Relocation and Major Relocation cases **+ CSA** ⇨ building from Lessons learnt from **3 detailed cases**, from 3 Release areas	Applying the **experience from the past** relocation cases to the remaining relocation cases.	The PD relocation Project Leader mentioned that there should the Lessons learnt (e.g. things listed) what has been done in the relocation, and pick up the experienced benefits from there. Benefits could be utilized in the remaining relocation cases.
3.	**Project Quality Management** ⇨ **Evaluation** for stages in the proposed QMF	**Checking the relocation health** and that it is on the right track.	The Program Manager suggested ensuring the expected tasks in the relocation, when going step by step. There are indicators defined, which describe that on certain time, certain issues must be in order to remain on track.
4.	**Project Quality Management** ⇨ **Checklists** for stages in for the suggested QMF	Avoiding pitfalls in the quality of PD during the relocation -> **checking the relocation** it is on the **right track.** .	The Program Manager suggested that it should be checked that there are no PD quality affecting pitfalls; there is a risk that something may have been overseen in the relocation. In such cases, it would be good to control those things, prepare for occurring impediments during the way. One thing could be to prepare a preventive and comprehensive plan for relocation.
5.	**Project Quality Management** ⇨ **a Proactive guide**, related to the stages of the ongoing PD relocation, for the suggested QMF.	**Creating a Proactive guide** for clarifying the relocation activities. Stress **on relocation Preparing, Planning, Reviewing, Implementing, Verifying, and Follow-up.**	The Program Manager advised that there are plenty of PD areas that involve a variety of tasks. Each area has a different turnaround during the relocation project. Therefore, these should be well taken in account during the relocation, and treated in sequence.

6.	Process of Relocation and Major Relocations + **CSA** ⇨ keeping the structure of **1. Actions, 2. Tools& metrics, 3. Social ties** for the suggested QMF.	Supporting the way to manage new Knowledge content and PD tasks **(1.2.3)** in some logical, understandable way	The Section Manager suggested it is very important from Release areas' perspective to debrief any details how the quality can be split into meaningful parts, treated and checked. This split helps to see how the relocation should go (quality-wise) and have certainty that everything is covered, from the quality perspective.
7.	Process of Relocation and Major Relocations + **CSA** ⇨ a special focus on **Social ties/ Interaction** (by checking it in Evaluation and Checklists) for the suggested QMF	Proposing the ways to manage **information sharing.**	The Section Manager suggested focusing on open communication by sharing the information in the relocation; it is very important from Release perspective somehow to debrief any details how it went and have certainty that everything is covered. The Section Manager also explained, *"If one side in the relocation has problem in recruiting, PD task ramp up or has overload, it must be well communicated."*

As seen in Table 19, these summarized key suggestions from the stakeholders were built around the challenges in quality management in the current PD relocation. Based on them, the initial proposal was developed and further discussed with the stakeholders for detailed feedback, including the additional documents supporting the Proposal. Based on several iterations of stakeholder involvement (interviews, discussions, workshops, brainstorming), the proposal was formulated into the Initial Proposal, as below.

5.3 Proposal for Quality Management Framework

The proposal is build based on the information collected in semi-structured interviews, discussions, workshops, etc. from the relocation stakeholders, by observations, internal document analysis, and by investigating the best practice from literature. To build this Proposal draft, the suggestions from the relocation stakeholders from the three Release areas A, B and C (involved in CSA) were involved.

The proposal suggests a Quality Management Framework (QMF) how the case company, in a knowledge intensive industry, can manage quality when relocating its product development (PD) to another country. The proposal for the Quality Management Framework (process) consists of: 1) Proactive Guide for PD relocation, 2) Checklists, and 3) Evaluations for managing quality in PD relocation.

5.3.1 Framework for Managing Quality in PD Relocation

The Figure 17 below presents the Quality Management Framework and shows its connected functions.

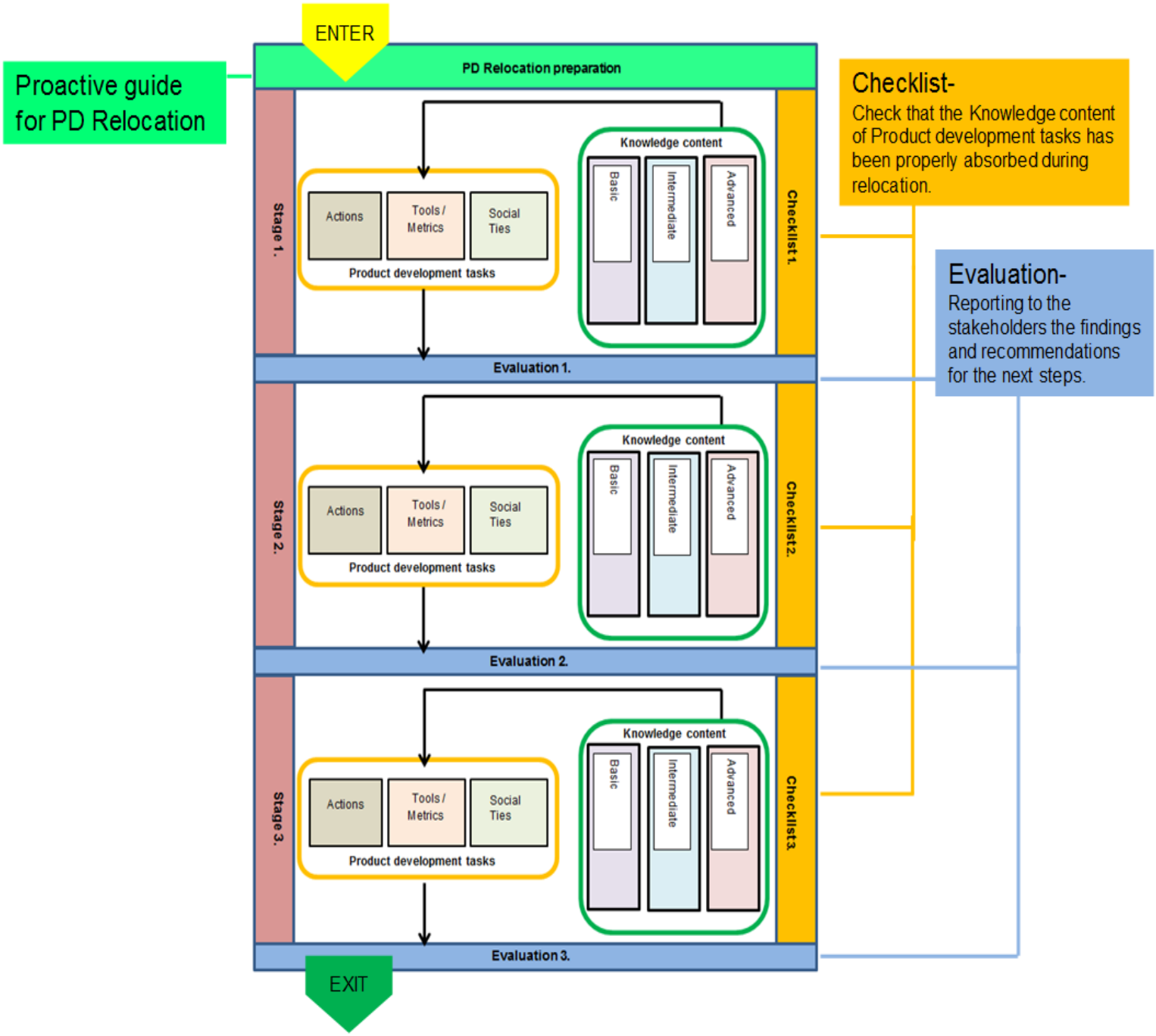


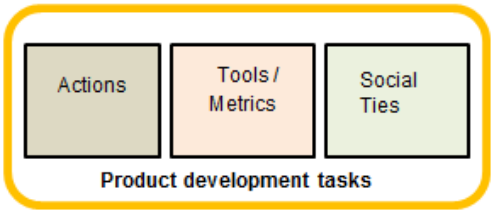
Figure 17. The Quality Management Framework.

As shown in Figure 17, the Quality Management Framework (QMF) is composed of three distinctive *Stages* (Stages 1, 2 and 3). Each stage consists of *product development tasks* of PD and associated *knowledge content.* The stages are in a sequenced order since, upon entering the QMF, the each stage is evaluated and accepted before

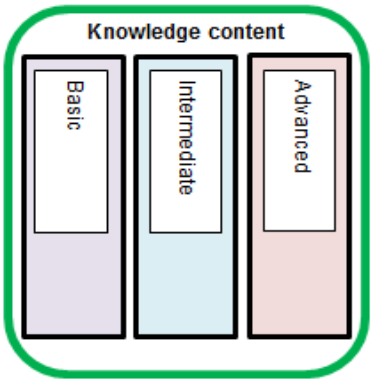
proceeding to the next one. Finally, when all stages are completed, the PD relocation process is closed. Each stage is described separately below.

First, the proposed QMF starts with the input from *the Proactive Guide for product development relocation.* It suggests practices for Preparing, Planning, Reviewing, (Piloting, if required), Verifying and Tracking the relocation project. This guide is not prescriptive and therefore adapted by each Release Area to their particular needs, in a way that fits to their objectives. As soon as the sending and the receiving sides of the relocation become known with (a) the Relocation project and (b) Proactive Guide, the implementation of actual stages begins.

Second, in any Stage, the relocation of *Product development tasks* include relocation and mastering the following activities: 1) *Actions,* or the ways of working that are required by a Release Area for managing their daily work of PD, 2) *Tools and metrics* which are utilized for managing and supporting the *actions* in PD in daily work, 3) Social ties, or adequate communication connections in daily work of PD. Thus, *product development tasks* (PD tasks) relate to the box inside each stage:



Third, the relocation of *Knowledge content* relates to the level of the receiving side skills and competence needed in PD tasks for acceptable execution of daily work. In other words, the receiving side needs to understand and learn this *Knowledge content* in order to work effectively. Due to the complexity of knowledge intensive content of PD, the knowledge content can be roughly divided into three categories: 1) *Basic*, 2) *Intermediate,* and 3) *Advanced.* The content of each category is particular to each Release area and therefore not specified here. Three categories are distinguished to ease their maturity evaluation (which is also developed by each Release Area separately, to meet their specific quality requirements). An example of structuring the knowledge content for Stage 1 is given in Appendix 4. The Knowledge content for each stage has the same structure as shown next:



Knowledge content (as shown in Appendix 4) consists of *maturity levels for skills and competences* required in PD. They identify what is the current maturity level of the receiving side, either for the individual or team skills and competences (Basic, Intermediate or Advanced). These levels serve as the starting point for evaluation and knowledge improvement. They set the goals for the training of skills and competences in each stage for reaching the required levels.

The training is organized so that the receiving side should absorb the knowledge and best practice, develop their skills and competencies in order to gain the necessary qualifications and work effectively for PD. The *mechanism* describes the methods for communicating and training in the PD relocation. These multiple ways of communication help to reinforce the main messages in relocating PD tasks.

Fourth, in order to support effective relocation, the *Checklist* lists and assesses the PD tasks executed by the receiving side during the relocation. It checks that none of the PD tasks containing Knowledge content is overlooked, and it helps to briefly assess that they are properly absorbed during the PD task relocation. It also checks that the PD tasks fit to the receiving side organization; if necessary, it may also point to the maturity level of skills and competences of the receiving side in these PD tasks. Therefore, it acts as an instrument in ensuring the quality of PD life-cycle continuum. The checklist is developed and adjusted for each Stage and each Release Area, and their PD tasks (Actions, Tools/Metrics and Social ties).

Finally, based on these steps, *the Evaluation* between the stages focuses on the nature of the PD relocation results and evaluates if possible and how to move to the next stage.

In the following sub-sections, the other parts of the QMF are discussed in more detail: the Proactive Guide, Checklist and Evaluation.

5.3.2 Proactive Guide for PD Relocation

The Proactive Guide is created for managing relocation activities and coordinating the sending and receiving side to ensure that they realize what is needed for handling their daily work in relocation. The guide proposes guidelines for managing PD relocation in the organization. The guide explains the steps and practices, in sequence, for Preparing, Planning, Reviewing, (Piloting, if required), Verifying and Tracking the PD relocation. It first defines the main activity and their sub-activities under each main activity.

The guide is not prescriptive and each Release Areas should take care to adjust this guide and make alterations, in order to fit their own objectives. The table of content of the Guide is shown in Appendix 5. Next, the main activities are briefly described.

A. Prepare for the PD relocation

   This section describes the preparation for relocation by declaring a relocation team and representatives around the relocation, investigation of the team skills and competence gaps, and provision of training, as appropriate.

B. Create the PD relocation plan

   The PD relocation plan details the functions that must be performed to accomplish a successful relocation. It provides instructions on how to handle every task associated with relocation effort. The plan proposes the roles and responsibilities, communication and coordination relationship for each side of relocation. In addition, the requirements and commitment needed for DP relocation are described, as is the map and schedule of PD tasks required for relocation explained. Finally, the identification of knowledge sharing and determination of training, performance indicator creation and tracking, and proposal for contingency plan are presented.

C. Review of the PD relocation plan.

   In this section, the review is done ensuring that the organization requirements are being met by the receiving side organization. The review proposes that all relevant procedures are in place, or considered, for PD task relocation. Consequently, the plan is sent finally to the relevant stakeholders for approval. Finally, the PD relocation plan is constantly reviewed and maintained during the whole PD relocation life-cycle.

D. Implement PD relocation pilot - if required and possible.

The PD relocation can be moderate to complex in scope. Therefore, a pilot could be planned and executed. In case previous experience in the PD skills and competence does not exist, a pilot project can be undertaken which serves as an assessment for the actual PD relocation. In addition, piloting can be used when there is doubt about the effectiveness of the Proactive Guide in relocation. A pilot can be used as a trial especially where there are clear expectations and deliverables, and the requirements are well documented. The guide defines the pilot planning and tracking of the progress, when initiated. In case of deviations, it is proposed that the required actions are taken and tracked for closure. Finally, the original PD relocation plan is updated based on the lessons learned from the pilot.

E. Verify readiness for successful PD relocation to the receiving side.

Successful relocation is dependent upon the ability to relocate or start up PD at the receiving side with stable and approved plan, and with minimal problems. This section provides information for verifying the readiness of PD relocation. The information consists of the interaction mechanisms, physical and technological environment, manning, procedures and guidelines, and contingency plan. The findings during the readiness verification are brought up, refined to fit into the detailed relocation plan, and then described into to the plan, as appropriate.

F. Track status and progress of the PD relocation against the plan.

This section explains the tracking the progress of the started PD relocation. In case of deviations in the relocation progress occurs, they are tracked, collected and required actions are taken to sort out the deviations. In addition, the contingency plan for continuity of PD life-cycle is triggered in case of deadlock situation in the relocation.

The more detailed content should be specified by Release areas, according to the common logic of suggested QMF. The content of the Proactive guide is shown in Appendix 5.

5.3.3 Checklist

The purpose of the Checklist is to provide consistent means for determining the performance of the receiving side, at a particular moment. Based on this logic, the sending side will develop a questionnaire for each QMF Stage which includes the relocated Actions, Tools/Metrics and Social ties. The questions are Release Area specific. They evaluate the maturity level of knowledge content absorbed by the receiving side, when it occurs. The difficulty level of checklist questions depend on how far through the stage the checklist is executed.

The checklist is targeted for both sides of the PD relocation, the sending side and receiving side. In addition, also the third party (e.g. external instructor) can be checked. The *questionnaire* can be created separately for a team or for the individual in the team; an individual may have different starting points and experience which does not apply to the whole team.

The checklist is developed by the assigned expert of the Release Area. Example of the checklist is shown in Appendix 6. The questions in the Checklist questionnaire are prepared focusing on both the relocation *Knowledge content* of *PD tasks* and lessons learnt during the relocation. To check the Knowledge content in each stage at QMF, the checklist questions have three maturity levels; 1) Basic, 2) Intermediate and 3) Advanced. The questions are different in difficulty, and the difficulty of questions is growing. It helps the expert to see the level of knowledge of the receiving side, at a particular moment. The questionnaire is targeted separately to assess each PD task (Actions, Tools/Metrics and Social ties), and answered in written format. In addition, the responder enters the marking to the adjacent column of each answer based on the importance of the issue in PD from the responder's point of view. In addition, the checklist can be presented as an online QM tool targeted at the relevant stage and side. Appendix 7, 8 and 9 present examples of the online checklist tool.

The checklist can be used to list the PD tasks and ensure that they are confidently deployed. The checklist points to the success, as well as areas for improvement without focusing on specific mistakes by an individual. This information is essential, and it is handled confidentially so that no one is hold against the results. The checklist of each QMF stage includes the PD tasks: Actions, Tools/Metrics, and Social ties. The goal is to reveal the real state of the PD relocation and proceedings on each stage.

5.3.4 Evaluation

As any Stage comes to an end, evaluation is done to assess the PD tasks and Knowledge content relocated to the receiving side. The evaluation is based on a report on the findings and recommendations in the relocation, and presents a conclusion as for meeting the expectations from the managers of PD relocation.

The evaluation is reported to the managers steering the relocation. The managers may use the requirements as they are described in the Proactive Guide as a roadmap and the evaluation results as guidance for helping them to keep the right focus through the relocation process. By evaluating each stage, it will allow managers to make timely improvements and reach the relocation objectives. In addition, the evaluation ensures that each requirement is appropriately addressed and there are no issues that have been forgotten or fallen out. This applies to each stage in the QMF.

The relocation team creates the Evaluation report (see an example of working instruction in Appendix 10 for the managers). The evaluation report is based on checklist assessments, observations in the relocation process and discussion with the individuals or team working for PD and serves as a gate to the next stage. The evaluation reports are reported to the managers of the relocation. Any issues or deviations are brought up, discussed, and consequently dealt by the managers.

Summing up, the proposed QMF is proposed as integrated to the actual PD relocation process, with the defined quality management activities in order to secure quality in PD relocations. This approach does not attempt to capture the complete details either of the PD relocation project or quality management activities for each of 12 Release Areas, since it would require different activities for each Release Area. But the proposed QMF sets up *a framework* for supporting the ongoing PD relocation and potentially future relocations. As shown in Proposal, the eventual target was to secure quality in PD relocations. However, it should be further piloted in other Release Areas and then decided, if the relocation should happen based on the proposed logic (from stage to stage), and if the quality in relocations would be helped by Checklists and Evaluations, or should they be changed for some other, more convenient tools.

6 Validation of the Proposal

This section describes the validation of the proposal for the QMF. First, it discusses the overview of the proposal process. Secondly, it describes the feedback and the required changes to the proposal from the relocation stakeholders. Finally, this section presents the final proposal which builds the final solution for the QMF as the outcome of this study.

6.1 Overview of the Proposal Validation (Data 3)

The proposal for the Quality Management Framework, described in Section 5, was presented in a workshop (Data 3) to the group of relocation stakeholders in the case company. The workshop was held and data collected based on the same technique as in previous workshops. The proposal was emailed to the stakeholders well before the workshop, and they were asked to review it for preparing feedback. In the actual workshop, stakeholders were asked for their feedback and change requests for the initial proposal in order to make required changes to the final proposal accordingly.

In the workshop, the initial proposal was presented and described to the stakeholders. The core outcomes were shown, as illustrated in Figure 18 below. The fit between *the mapped relocation processes* was matched against *the proposed QM Framework* and the stages for its implementation.

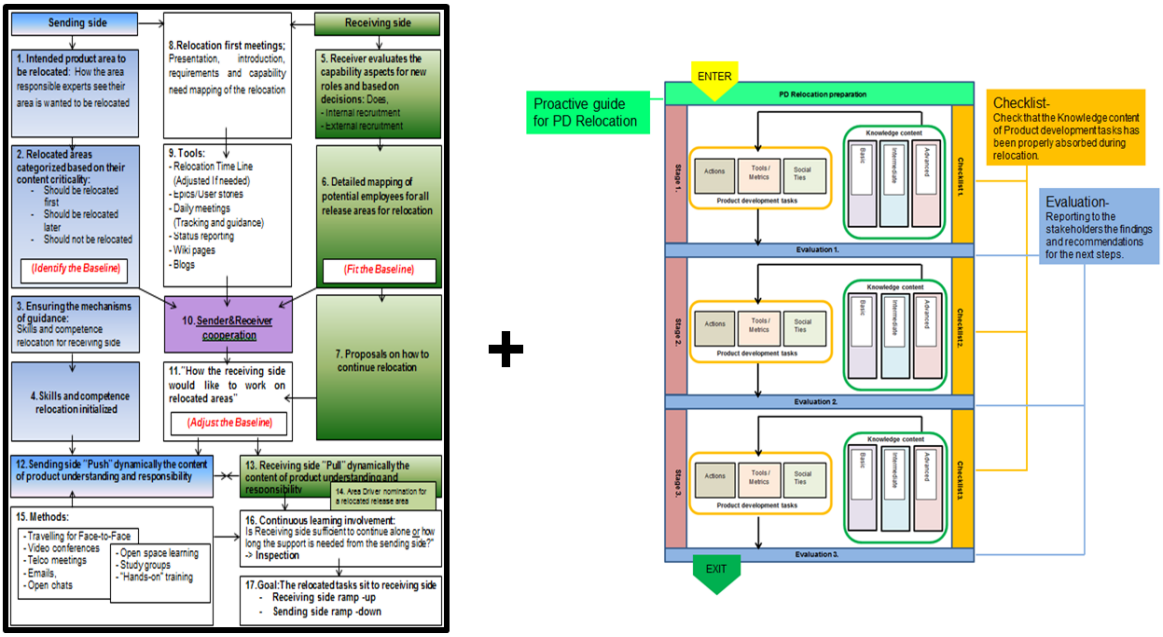


Figure 18. Core elements of the Proposal: the specified PD relocation process and the QM Framework matching it.

The validation session also discussed the impacts of implementing the proposed QM Framework. Constructive discussions were held based on the QMF and its practices during the workshop. Due to time constraints, the proposal for QMF was not verified in the ongoing PD relocation. Therefore, it was given forward as for recommendation to the Release Areas taking part in the ongoing relocation.

6.2 Feedback on the Quality Management Framework proposal

Generally, the proposal for QMF received positive feedback. Especially, the QMF process itself was noted as important topic, as well as the approach to support the ongoing PD relocation was evaluated as efficient. The stakeholders indicated that the presented proposal concerning QMF process constructed by 1) logical Stages, 2) PD tasks, and 3) Knowledge content including the related functions; a) Proactive Guide, b) Checklists, and Evaluations, are realistic and effective if people in the PD relocation knew how to use them efficiently.

> "You managed to build from all aspects three types on categorization (Actions, Tools/Metrics, Social ties) which covers all the relevant issues in the ongoing relocation."
>
> - Section Manager (Quality Manager) (HU) –

Moreover, the stakeholders raised further suggestions during the validation session. The suggestions were discussed together and based on them, some change requests for the proposed QMF were implemented. The following Table 20 sums up the feedback for the change requests from the stakeholders.

Table 20. Feedback (Data 3) for proposal for the QMF to support the ongoing PD relocations. (Based on introducing Proposal to stakeholders in the case company).

#	Functions of the Proposal	Stakeholder feedback	Description of feedback
1.	Proactive Guide for PD relocation	**Main Activity 5: Implement PD relocation Pilot** – Move under the Main_Activity "Verify Readiness" as last sub activity and change it as optional activity.	The PD relocation Project Leader explained that there is enough flexibility by both sides in the ongoing PD relocation. Therefore, the Piloting part does not necessarily fit to the Proactive Guide as main activity. In addition, piloting might take too much time. However, it is good idea to mention piloting in the Proactive Guide. 1) Piloting should be handled as a method for verifying that readiness for PD relocation has been achieved. Therefore, it should be moved under "Verify Readiness" as sub activity.

			2) Guide should mention that piloting can be also executed for certain parts of Release Area PD, not necessarily to whole PD. 3) Piloting should be mentioned as "optional" in the Proactive Guide.
2.	Proactive Guide for PD relocation	**Main_Activity 7: Track status and progress** - Insert text for "findings based on Checklist "to sub Activity A.	The PD relocation Project Leader explained that Checklist is in a major role in the QMF and it should be mentioned when executing the PD relocation and it should be set in the sub activities under Main_Activity 7.
3.	Proactive Guide for PD relocation	**Main_Activity 7: Track status and progress** – Insert sub activity for re-planning during execution.	The Section Manager emphasized that during the PD relocation execution, when the reviews are collected, there is possibility to re-plan; detailed re-planning can be useful during the PD relocation execution, not only prior it. This is because things can change during the relocation; execution may take months, or years. "People and priorities can change in the relocation time line" - Section Manager (Quality Manager) (HU)-
4.	Evaluation	**Evaluation report** – Add "General status" as subset under Description of Actions, Tools/Metrics and Social ties.	The Program Manager explained that the evaluation report should not only give negative picture from the ongoing PD relocation, but also it should include found good practices which can be used to the next stage, or to another PD relocation project.

As seen from Table 20, only a few changes were requested to the proposal. Overall, the extensive planning and a major preparation for PD relocation suggested in the proposal were found well formulated in the Proactive Guide. Moreover, it was indicated that detailed planning should take place before the relocation starts. Additionally, it was found important that the written answers in the checklist are collectively analyzed and summarized in the Evaluation to realize the overall maturity of the PD relocation. It was extended with a suggestion for allowing the mutual understanding to emerge to what means a mature level in the PD relocation project.

In addition, it was pointed out that, even though the Proactive Guide includes suggestions for performance indicators for the PD relocation, that there could be additional measurements for indicating the results from the completed PD relocation. It would reveal what can be expected in terms of its success or failure. However, at the same time it was mentioned that this particular topic is not in focus of this case study, and therefore should be included in the future studies.

Based on the gathered feedback and change requests, the QMF was fine-tuned. As for the resulting changes to the QMF, the changes are discussed in the next subsection.

6.3 Final Proposal

Based on the initial proposal presented in Section 5 and its validation described in Section 6, the final proposal of QMF was constructed to support the ongoing PD relocations from Country A to Country B in the case company.

The requested changes from the stakeholders were included to the study, and the finalized version of the proposal was built. The content of the finalized proposal is presented in the Appendixes of this study. The following table 21 summarizes the proposed *QM Framework to support the ongoing PD relocations* which includes:

Appendix #.	Final Proposal
Appendix 3	The Quality Management Frame work.
Appendix 4.	Knowledge content maturity levels for stages in Quality Management Framework.
Appendix 5.	Table of Contents of the Proactive Guide in PD relocation.
Appendix 6.	The stage Checklist example of Quality Management Framework.
Appendix 10.	Evaluation report template for a QMF stage.
Appendix 11.	Proactive Guide in PD relocation.

Table 21. Summary of the proposed Quality Management Framework for the ongoing PD relocation.

After the core of the QM Framework was validated with the case company stakeholders, the actual detailed QM content was left for the Release Areas to add which take part in the ongoing relocation. The QM Framework presents only the core approach and indicates the practices to support the case company PD relocation. It coordinates the objectives that are required to ensure that the sending and receiving sides understand what is needed for handling the relocation. By implementing the proposal, the case company could ensure the relocated PD quality during the relocation process, and at the same time, make the relocation process more effective, since the QMF maps the PD relocation and ensures that the PD tasks fit qualitatively to the skills of the Receiving side of the relocation.

The next section concludes and presents the outcome of the study.

7 Conclusions

This section discusses the outcome of this study and presents the evaluation of the study for developing a Quality Management Framework to support the ongoing PD relocations from Country A to Country B. In addition, this section matches the initial objective versus the final outcome, and discusses reliability and validity of the research process in this study.

7.1 Summary

The goal of this project was to find an approach to secure quality in the ongoing PD relocations by acting proactively, during the relocation to a new country. The objective was eventually specified as proposing *a Quality Management Framework support the ongoing PD relocation* from Country A to Country B. In order to achieve this objective, the study explored and analyzed the actual product and its PD that is being relocated, and the current state of quality management in the ongoing PD relocation. The findings pointed to strengths and weaknesses in the ongoing relocation and its quality management, and categorized the practices used by the stakeholders for quality management. To suggest a better, well-proven solution for managing quality in major relocations, the study explored and scrutinized best practice and available knowledge for this topic. Based on the finding, the study proposed a QM Framework to manage: a) quality in major PD relocations, b) concreate actions and steps to approach and evaluate quality of operations in relocations, and c) a starting point to discuss their acceptable levels. Therefore, the quality concerns and need for a quality approach in PD relocation were put forward as the key focus for the Proposal building.

The output of CSA revealed that a certain structure can be logically built in the activities related to quality management as practiced in the current daily work of the Release areas. These activities were divided into a) Actions, which are the ways of working that are required by a Release Area for managing the daily work of PD, b) Tools and Metrics, that are utilized for managing and supporting the Actions in the daily work of PD and c) Social ties, that are the communication connections in the daily work of PD. This finding helped to establish a core foundation for building a QM Framework, and was later validated as an important outcome of the study. Since quality in the PD cycle must be kept constant, this approach allows to identify concreate quality activities and thus built a QM Framework relevant for all stakeholders.

For building the proposal for the case company, key findings in the CSA and key suggestions from existing knowledge were merged and resulted in a Quality Management

Framework for PD relocations. The proposed Framework includes: 1) Proactive guide for managing quality in the PD relocation (in other words, a detailed PD relocation instruction), 2) a process for implementing the QM Framework that is split into three stages, 3) Checklist, for checking specific PD tasks and their knowledge content (with concreate activities indicated and checked according to specific A. Actions, B. Tools and metrics, C. Social ties used for managing quality in relocations); and finally, 4) Evaluation, a procedure for the managers explaining the status, key findings, expected levels, outcomes, and recommendations for the next steps in each stage of QM in relocation.

The proposal was built in collaboration with the key stakeholders from three release areas and validated with the management; it involved the stakeholders from both the receiving and the sending sides of the relocation. Based on the validation, the proposal was further amended and finalized. Finally, the QM Framework was officially recommended for use by the Release Areas which are taking part in the ongoing PD relocation.

7.2 Evaluation of the Study

The proposed QM Framework was evaluated by the case company as providing the steps and practices for achieving efficient PD relocation. It also includes performance indicators (Proactive Guide) for tracking the concurrent steps by the twelve Release areas in the PD relocation. As for the future, the QMF could be developed for providing further steps for supporting also *the exit* from the relocation. As discussed in section 6.2, the stakeholders suggested that the measurements for indicating the actual results from completed PD relocation should be added in the future study. This is due to the key quality requirement from the company that any risk of a flaw product released to the customer should be absolutely minimized. The outcome of this study provides methodology for embedding such future measurements for indicating the outcome, success or failure, of a PD relocation. The current performance indicators in this study create a link to the risk level. But the actual measurement for indicating this risk level should be defined in a subsequent study.

7.2.1 Objective versus the Outcome

Due to strategic goal of cost savings and freeing up personnel for new PD, the objective set for this study was to explore the relocation process in order to secure quality in

relocations, both currently and also in the future. In the case company, it is vital, that the PD relocation is executed qualitatively so that, at the end, the product quality in the relocation is ensured. Therefore, the objective of this study was focused on supporting PD relocations. Subsequently, this study objective was formulated as: Developing a Quality Management Framework to support the ongoing PD relocations from Country A to Country B.

The current state analysis revealed the key weaknesses in the ongoing PD relocation and its quality management. Based on this, the quality challenges were chosen for further scrutiny. The suggestions from stakeholders of the PD relocation, best practice and available knowledge from the literature generated an approach for a new QM Framework. On top of that, the active input from the PD relocation stakeholders helped to formulate it into a viable Proposal. It is worth mentioning that the objective versus the outcome of this study were frequently evaluated and therefore aligned with the study objective as well as the company goals for this project. The level of engagement from the PD relocation stakeholders has been one of the main strengths of this study. Moreover, the professionalism and experience of the PD in both side of the ongoing relocation has been an invaluable asset in driving the outcome of this study. Finally, the validation also confirmed that the outcome meets the objective set for this study.

In summary, this study provides a framework for supporting the ongoing PD relocation in the case company from the quality perspective. The stakeholders in the PD Release Areas may use this framework, and modify the content to fit for their purpose. To that end the framework does not only provide practices for supporting the PD relocation but also provide the way for keeping up the quality of PD when it is relocated.

7.2.2 Reliability and Validity of this Study

For evaluating this case study, first, the research objective was described and compared to the outcome of this study. Secondly, the reliability and validity needs to be proven based on the reliability and validity plan described earlier in Section 2.4.

Validity of this study was ensured by taking three steps. First, by grounding the data and utilizing different data sources and by carrying out three distinctive data collections. Secondly, the data in this study was collected by utilizing different data collection methods including interviews and workshops as primary data sources, with the case company stakeholders and experts who are actively involved in the PD relocation, both from the sending side and the receiving side. In addition, the data was collected by

reviewing the company internal documents and by observation. The diversity in the background of both sides of the relocation has allowed the possibility to analyse data from different perspectives. Thirdly, this study applied the acknowledged best practice and available knowledge from the literature, such as case studies from knowledge intensive industry PD relocations, PMBOK and other relevant approaches.

Furthermore, the reliability of this study was ensured by carefully selecting criteria for supporting the research objective and implementing the research design. Therefore, it could be considered as focused on the outcome. The data was collected from various sources, carefully analysed, categorised, re-checked with the stakeholders, and fed into the proposal development (which was an exceptionally time consuming process during the course of developing this study). Consequently, this study can be considered as reliable, since it also reached the initial goal from the case company perspective. After all, the case company found the key findings from this study as practical, and the proposal of QM Framework as creating a valuable approach for the ongoing PD relocation.

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Appendix 1. Example of Interview questions and answers summary.

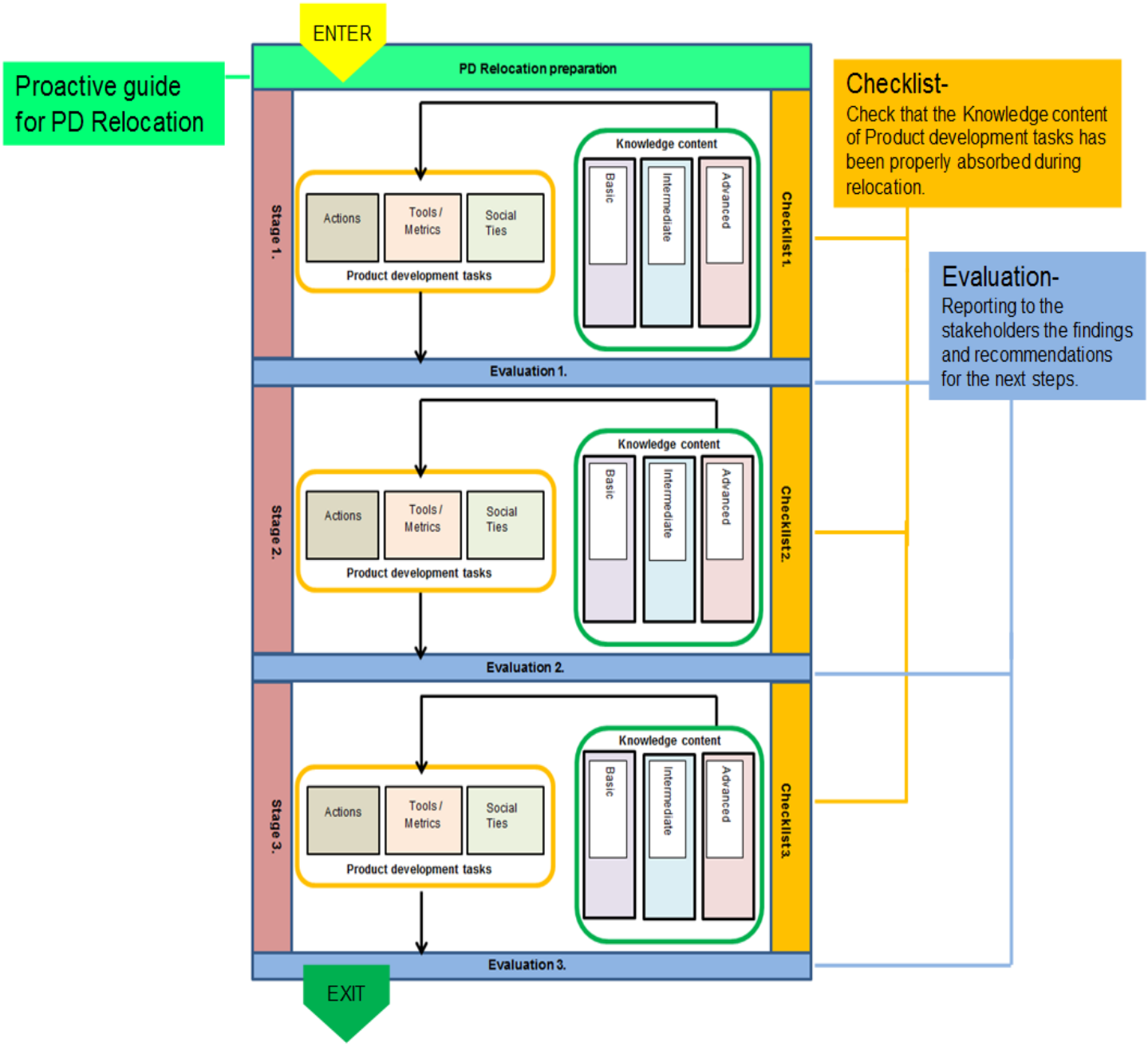
PD relocation Group A Tech	1.Concerns or doubts on the current PD relocation at hand	2.Failures in the area during PD relocation	3.How to keep the quality of PD during and after relocation	4. Indications that receiver is ready to take full PD	5.Moving of skills and competence ensures the sustainability of quality in this PD relocation	6. Any competence or capability gaps during the PD relocation activities	7. Idea/practice by which it can be assured that the skills and competence have qualitatively moved in the PD relocation	8. Verify that the quality of the operation of PD relocation is sustained when it is moved to the Receiver
Interviewee A2	• Learning of new tasks could have effect on Development throughput	• Too hectic PD relocation in some new areas resulted to too much work taken at the same time, and too fast This result This result to - Overload of work - Pressure for the SW developer employees at receiving side - Some PD relocation area tasks put to hold for re-planning and building of processes.	• Constant status reporting of the areas of PD relocation. •Planning for the near future	• Real indicators: the quarter2/2015 product release (first product release on shared responsibility) + successful piloting • Good perception and feedback from the customer and the stakeholders • Task lists completed and approved	•Yes, if we can relocate PD as much as possible if receiving side has established neces- sary competence •It is basically a recip e of Basic competen ce added by 1-2 months training and "hands-on-training" using personal skills added by competencies what was just learned	• Receiving side has no Maintenance competence • Major gap in IMS level competence (the entity connected externally to product under PD relocation). - How to configure the node in real life environment - How to use it in real life environment - skills and competence gap on real life traffic mixes - Skills and competence gap on configuration and network setups	• Constant communication and monitoring • Daily meetings • Release planning meetings for all involved parties in the PD relocation. •Stickers on the wall on which stakeholders of PD relocation discuss everyday	Define first to receiver what are the quality requirements • Personal contacts and daily discussions (Email, Chat etc.) between both sides of PD relocation. • Up-to-Date written documentation on daily work •Receiving side follows the Sending side way-of-working and learn from it • Feedback from customers and stakeholders

9. How to secure the quality of PD responsibility when it is relocated to another country	10. Is there a process already available which secures the quality of the PD relocation?	11. Receiving side need to build skills which have been built over years at Sending side ;	12. Tacit and Explicit knowledge is qualitatively sustained during the PD relocation (not compromised)	13.Unpredictabilities during PD relocation	14. Possible to relocate all PD to the receiver?	15.The PD relocation level of communication	16.Receiver side capability meet the PD relocation requirements	17. Enough time to move the skills and competence in PD relocation
• By understanding what are the Used Cases of product •To understand the scope of verification and work on how receiving side could approve it • Create guidelines on “what we want to do to ensure the quality” •Checklists for acceptance criteria for showing how the areas are covered during PD relocation. •Constant discussion •Measure the state of community how they feel about the PD relocation. •Agile approach on team level; Daily meetings, Retro meetings, Coaching.	No	• Product Line Maintenance (PLM) and customer support needs effort on building skills and competence at the receiving side • Media Resource System (MRS) area need to grow the knowledge of product interworking devices	•No chance to relocate everything -cannot clone people or relocate intuitions and gut feelings • Requires peer working and common user stories • Plan some refactoring for PD relocation focus areas for which receiving side can easily affect with sending side for which the PD is relocated	• Receiving side of PD relocation areas received tasks which they might have heard about but were not sure what it covers - "black box" areas - Re-planning required due to underestimation of the "black box" areas	• Yes, if no strict time line • Yes, if pre-work started early enough for PD relocation.	•The sender/ receiver culture of collaboration and contacts working well overall. • Receiving side has questions still . For this, the sending side is available for all times (that was also planned) • Integrity Function area employees at receiving side had pretty hard time to get the information during the PD relocation because they did not had personal contact prior the PD relocation.	• Overall yes, still they need to "optimize" ; capability wise tackle on some specific obstacles and work with less people in future • Receiving side should take only what it can handle at the time	• The plans are always changing on what should receiving side take over - depended on the current market situation (needed rapid skills and competence in some areas)

Appendix 2. Key activities and challenges in the PD relocation of A, B and C Release Areas.

#	Key activities in the ongoing PD relocation
	The sending side Scrum Master visited receiving side and presented the way of working on high level.
	Workshop attended at the receiving side where release area tasks were presented (Tools, methods, documentation).
	Workshop and on-the-job training on both A and B release areas (approx. Three weeks).
	Video meetings: First weekly, then bi-weekly and finally on the need basis.
	The complete release area processes, roles, responsibilities and tools relocated; condensed to less people at receiving side.
	The receiving side scope is on optimizing the actions and tool usage; they executed the relocated task manually one time, after they automatized it.
	Sending side supervised and piloted the release area task relocation : In failure, new checking of activities was executed. In success, release area task was relocated.
	Product development management monitors the requirements and competence/compatibility fulfillment.
	The sending side support requests diminishing and their involvement were not required anymore by the receiving side.
	Relocation close and exit

Appendix 3. The Quality Management Framework.

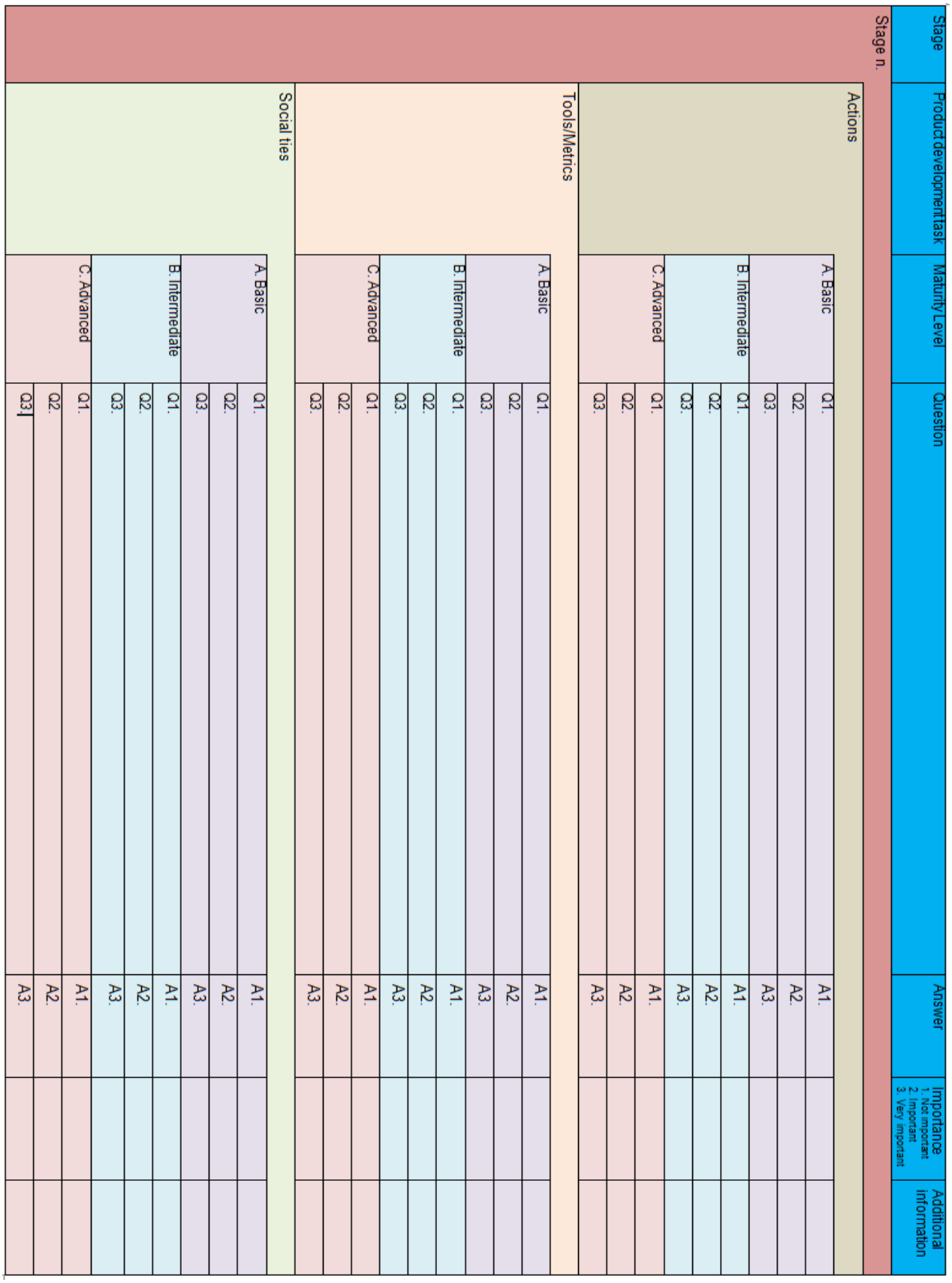


Appendix 4. Knowledge content maturity levels for stages in Quality Management Framework.

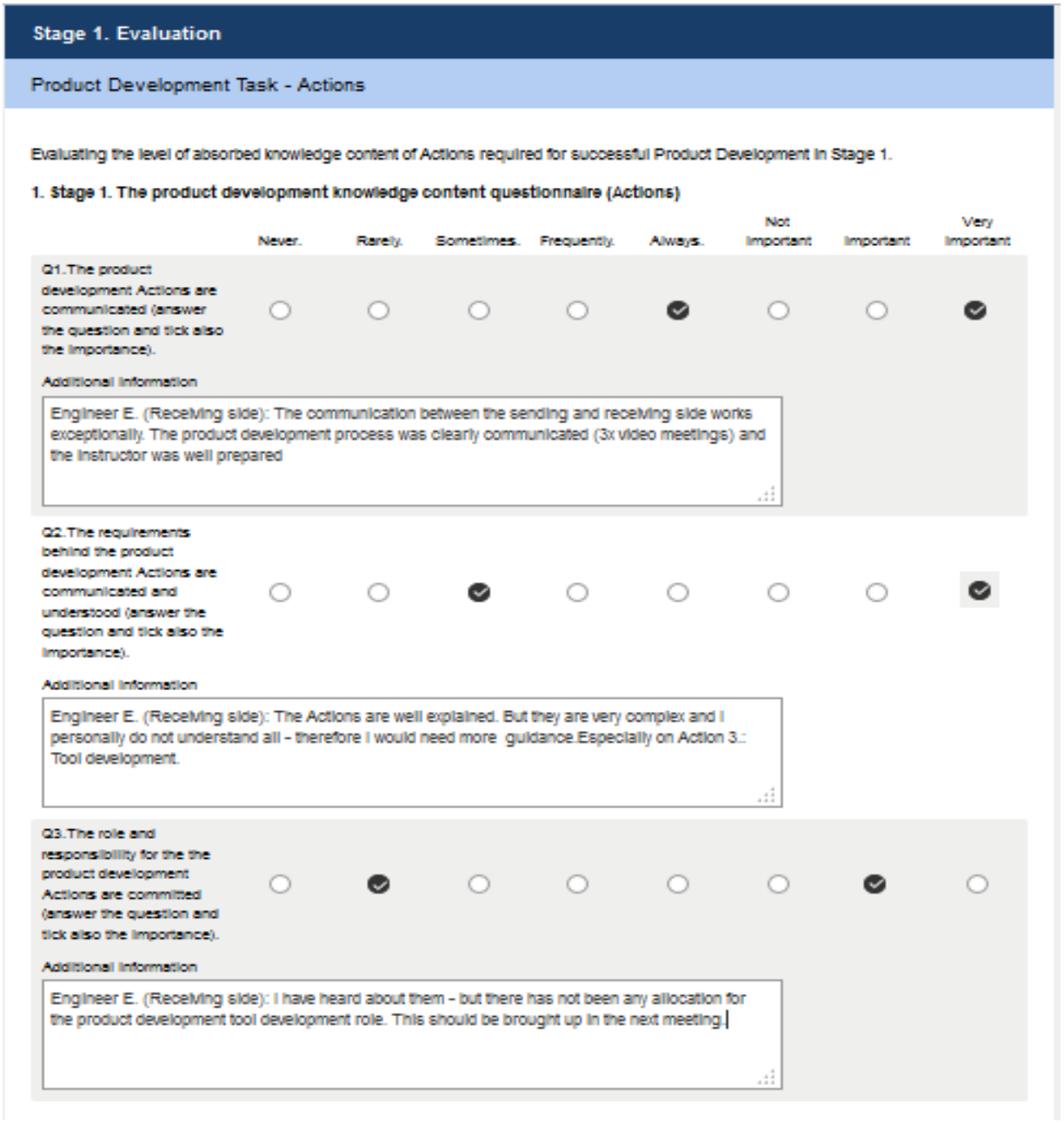
	Maturity Level of Knowledge content	Description of the level of training required for the Knowledge content	Mechanism for distributing training.
Relocation Stage	**Basic:** • Individual or group workforce practices are only ad hoc and inconsistent. • Roles and Responsibilities are rarely clarified. • Poses some or no previous skills and competence. Goal: Absorb and adopt basic skills and competence. • Focus in establishing basic practices on individual or group level.	Provision of, • Basic training of product development tasks on general level. • Distribution of operative and technical information on general level. • General level advisory. • Additional content based on the needs.	1.Off-site mentoring 2.On-site and/or off-site coaching 3."Learning-by-doing" training 4.Internal online training 5.Experimentation 6.Document reviewing 7.Social happenings 8.Workshops 9.Video-conference 10.Teleconference 11.Email 12.Wiki site 13.Blog posts 14. Seminars 15. Bulletin boards 16. Forums
	Intermediate: • Individual or group workforce practices are basic. • May address immediate faults and errors; the performed practices may vary inside the team. • Able to adopt easy or basic tasks. Corrective actions are applied, as appropriate Goal: Absorb and adopt intermediate skills and competence. • Focus in establishing competency-based processes. • Individual or group able to share and implement in normal conditions.	Provision of , • Medium/large scale training of product development tasks. • Detailed distribution of operative and technical information (if required). • Strong advisory. • Additional content based on the needs.	
	Advanced: • Individual or group has capable skills and knowledge for establishing competency required processes in normal conditions. • Able to share and implement in normal conditions. Corrective actions are applied, as appropriate. Goal: Absorb and adopt advanced skills and competence. • Focus in critical processes and in predictability of the performance. • Individual or group able to manage and share experiences in delicate conditions and do Continuous Improvement.	Provision of, • Meticulous (holistic) training of product development tasks. • Distribution of complex operative and technical details (if required). • Strong advisory. • Additional content based on the needs.	

Appendix 5. Table of Contents of the Proactive Guide in PD relocation.

Appendix 6. The stage Checklist example of Quality Management Framework.



Appendix 7. Example of a checklist of PD tasks: Actions.



Stage 1. Evaluation

Product Development Task - Actions

Evaluating the level of absorbed knowledge content of Actions required for successful Product Development in Stage 1.

1. Stage 1. The product development knowledge content questionnaire (Actions)

	Never.	Rarely.	Sometimes.	Frequently.	Always.	Not important	Important	Very important
Q1.The product development Actions are communicated (answer the question and tick also the importance).	○	○	○	○	●	○	○	●

Additional information

Engineer E. (Receiving side): The communication between the sending and receiving side works exceptionally. The product development process was clearly communicated (3x video meetings) and the instructor was well prepared

Q2.The requirements behind the product development Actions are communicated and understood (answer the question and tick also the importance).	○	○	●	○	○	○	○	●

Additional information

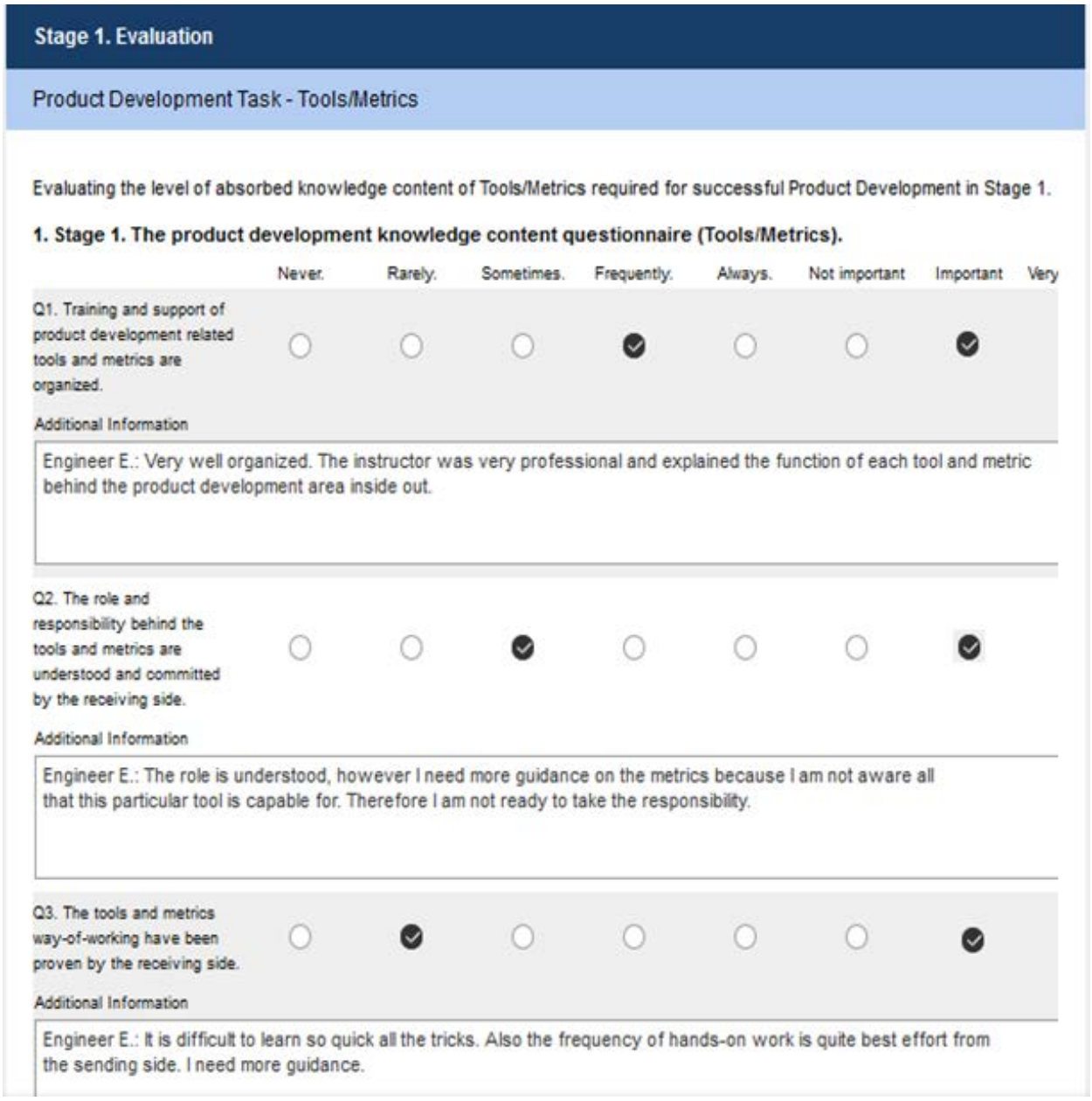
Engineer E. (Receiving side): The Actions are well explained. But they are very complex and I personally do not understand all - therefore I would need more guidance.Especially on Action 3.: Tool development.

Q3.The role and responsibility for the the product development Actions are committed (answer the question and tick also the importance).	○	●	○	○	○	○	●	○

Additional information

Engineer E. (Receiving side): I have heard about them - but there has not been any allocation for the product development tool development role. This should be brought up in the next meeting.

Appendix 8. Example of a checklist of PD tasks: Tools and Metrics.



Stage 1. Evaluation

Product Development Task - Tools/Metrics

Evaluating the level of absorbed knowledge content of Tools/Metrics required for successful Product Development in Stage 1.

1. Stage 1. The product development knowledge content questionnaire (Tools/Metrics).

	Never.	Rarely.	Sometimes.	Frequently.	Always.	Not important	Important	Very
Q1. Training and support of product development related tools and metrics are organized.	○	○	○	●	○	○	●	

Additional Information

Engineer E.: Very well organized. The instructor was very professional and explained the function of each tool and metric behind the product development area inside out.

Q2. The role and responsibility behind the tools and metrics are understood and committed by the receiving side.	○	○	●	○	○	○	●	

Additional Information

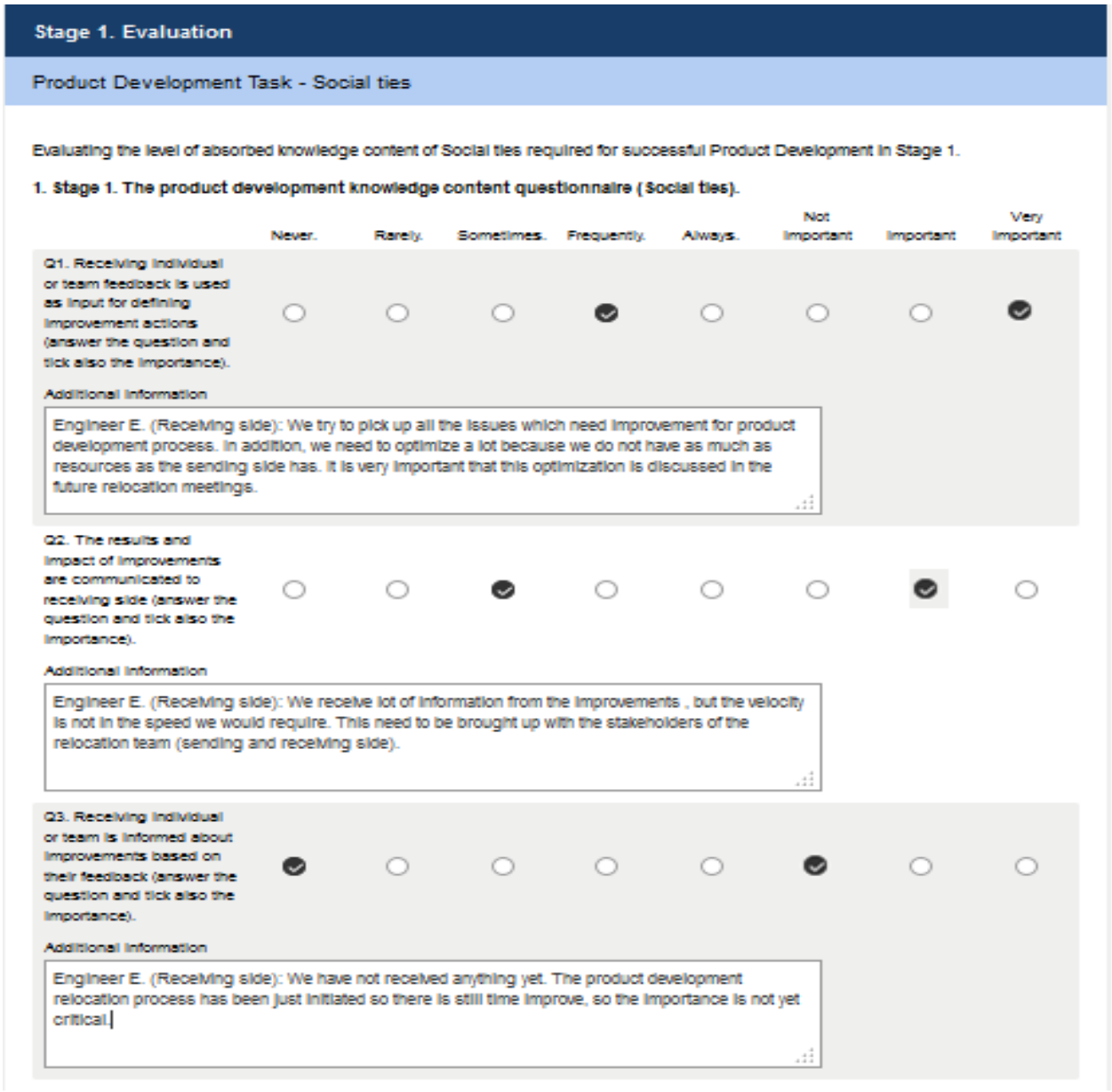
Engineer E.: The role is understood, however I need more guidance on the metrics because I am not aware all that this particular tool is capable for. Therefore I am not ready to take the responsibility.

Q3. The tools and metrics way-of-working have been proven by the receiving side.	○	●	○	○	○	○	●	

Additional Information

Engineer E.: It is difficult to learn so quick all the tricks. Also the frequency of hands-on work is quite best effort from the sending side. I need more guidance.

Appendix 9. Example of a checklist of PD tasks: Social ties.



Stage 1. Evaluation

Product Development Task - Social ties

Evaluating the level of absorbed knowledge content of Social ties required for successful Product Development in Stage 1.

1. Stage 1. The product development knowledge content questionnaire (Social ties).

	Never.	Rarely.	Sometimes.	Frequently.	Always.	Not important	Important	Very important
Q1. Receiving individual or team feedback is used as input for defining improvement actions (answer the question and tick also the importance).	○	○	○	●	○	○	○	●

Additional information

Engineer E. (Receiving side): We try to pick up all the issues which need improvement for product development process. In addition, we need to optimize a lot because we do not have as much as resources as the sending side has. It is very important that this optimization is discussed in the future relocation meetings.

Q2. The results and impact of improvements are communicated to receiving side (answer the question and tick also the importance).	○	○	●	○	○	○	●	○

Additional information

Engineer E. (Receiving side): We receive lot of information from the improvements , but the velocity is not in the speed we would require. This need to be brought up with the stakeholders of the relocation team (sending and receiving side).

Q3. Receiving individual or team is informed about improvements based on their feedback (answer the question and tick also the importance).	●	○	○	○	○	●	○	○

Additional information

Engineer E. (Receiving side): We have not received anything yet. The product development relocation process has been just initiated so there is still time improve, so the importance is not yet critical.

Appendix 10. Evaluation report template for a QMF stage.

Evaluation Report of Release Area B

1 Executive Summary

1.1 Introduction

This evaluation report is used at the end of QMF stage to present the findings relating to the particular stage under relocation. This report will include the obtained results from checklist and observations that occurred during the stage. The report will include recommendations as to the future course of steps regarding the stages.

1.1.1 Background

The evaluation report is described based on the general status, findings and recommendations from the QMF stage of the Release Area B product development relocation.

1.1.2 Description

- General Data Sources and Instruments / Methods for Data collection.
- General status and findings per product development task, and resulting recommendations for next steps in the relocation (that are directly linked to relevant data from the stage).
    - Actions:
        - General status
        - Findings
        - Recommendations
    - Tools/Metrics
        - General status
        - Findings
        - Recommendations
    - Social ties:
        - General status
        - Findings
        - Recommendations

Appendix 11. Proactive Guide in PD relocation.

Proactive guide for the product development relocation

Version	Description	Author
Approved	First revision	Marcel von Holten

Contents

1 Introduction

This guide proposes best practices for managing product development relocation. It can be used as guidance for managing product development relocations in the organization.

The guide gives practices for preparing, planning, reviewing, verifying and tracking the product development relocation. It is constructed by identifying the main activity first and then the sub-activities which are bind under each main activity. The guide activities should be followed in sequence to receive optimal outcome f the process of product development relocation.

This guide is not prescriptive; organization should take care to apply this guide in a way that fits to their own objectives.

2 Main_Activity: Prepare for the product development relocation.

1.Main_Activity	Prepare for the product development relocation.
Additional information:	• Organization could hire coordinator to work closely with the relocation team for planning and tracking the relocation. Or, develop a joint relocation team, composed of sending and receiving side personnel.
Description:	• Preparation for relocation is critical. It is for establishing expectations for the sending side and its organization. It forms the basis for tracking and reviewing the product development tasks during the relocation.

2.1 Sub_Activity_A: Establish an organizational structure for managing the activities for product development relocation.

Sub_Activity_A	Establish an organizational structure for managing the activities for product development relocation.
Additional Information:	
Description:	1. Choose and declare relocation team of individuals from both sides of the relocation for planning and tracking the re-location of the product development relocation. •The team consists of individuals for carrying out development relocation. •This team will be managed and controlled by elected Project Owner and Process Manager for the product development relocation. •Team will efficiently manage the relocation of product development tasks in order to deliver the organization requirements. •The team ensures that all aspects of the product development relocation and deployment are adequately handled. 2. Declare the sending side organization's relocation team act as SME (Subject Matter Experts) for relocation. • The sending side relocation team consists of key personnel currently managing their area of product development and deployment. 3. Identify representatives and other contributors from across the organization to be called upon to provide support and facilitate the product development relocation.

2.2 Sub_Activity_B: Identify and analyse gaps in skills and competences.

Sub_Activity_B	Identify and analyze gaps in skills and competences.
Additional Information:	Gaps need to be investigated, directly from individual or team. It is for understanding current observed skills and competencies. • When team members are drawn exclusively from the organization or recruited outside, they may begin with an experience deficit that puts them at a real disadvantage. • New employees with little or no training can lead to costly mistakes that can contribute to failure in the relocation relationship.
Description	1. Describe and analyze the individual or team skills and competencies required against the existing competency inventory in the declared relocation team and make them visible. 2. In addition, the receiving side organization documents the detailed definitions of all internal skills and competencies, and creates process descriptions for problem management, change management, work authorization and performance management. These are send to sending side review and approval.

2.3 Sub_Activity_C: Provide training, as appropriate.

Sub_Activity_C	Provide training, as appropriate.
Additional Information:	• Training should be started already prior or during the product development relocation. • Training may web-based teleconference or video meeting, classroom-based; self- taught with supporting course materials, including electronic and web- based materials

	(Check Staging form for media and mechanisms)
Description:	Based on the outcome of the analyzes - provide training to the individual or team, as appropriate. 1. Identify the type, content, and format of training to be delivered to the individual or team. 2. Create training database (and declare ownership) where the knowledge for training is kept and maintained. 3. Declare principles for using the database (common way of working). 4. Request and collect feedback on the training. 5. Review and make improvements to the training based on feedback.

3 Main_Activity: Create the product development relocation plan.

2.Main_Activity	Create the product development relocation plan.
Description:	Relocation plan is the document which identifies and details all functions that must be performed to accomplish a successful relocation. It should provide step-by-step instructions on how to handle every task associated with relocation effort. The relocation plan should be developed as soon as possible prior the actual relocation occurs and should be revised during it, as appropriate.
Additional information:	• The product development relocation plan focus is on technical activities and changes in the organization, team or individual. • Ensure that the product development relocation plan address continuity of product development life-cycle during the relocation. • The receiving side organization designs the product development relocation plan jointly with the sending side, or entrust the responsibility of creating the relocation plan to the sending side. • Tasks include relocated product development team Actions, Tools/metrics and Social ties, utilized in daily work.

3.1 Sub_Activity_A: Define the roles and responsibilities of each side of the relocation

Sub_Activity_A	Define the roles and responsibilities of each side of the relocation
Additional Information:	• Training should be started already prior or during the product development relocation. • Training may web-based teleconference or video meeting, classroom-based; self- taught with supporting course materials, including electronic and web- based materials (Check Staging form for media and mechanisms)
Description	Both sides of the relocation create together role and responsibilities map (e.g. flow or matrix) to define the handover roles and responsibilities. The following roles and their responsibility descriptions are needed for the relocation (The Process Manager and PO roles can be combined for single individual). • Process Manager for product development relocation planning - Managing the functions that are included in relocation, like resource requests. - Financing role for activities and resources in relocation. - Reports to higher management. - Coordinating relocation activities across the organiza tion, like Project Managers. - Escalation channel for issues which cannot be handled by the Project Owner or relocation team. - Makes sure that relocation reaches the objectives set in the organization requirements. • Project Owner for product development relocation planning. - Set requirements, scope and policies for relocation. - Tracking the relocation and deployment processes to make sure that they work together and fits to the purpose. - Help relocation team with relocation tasks prioritization. - Be in contact with the other representatives and contributors from across the organization to arrange resources to support the relocation planning and work. - Other generic PO work for relocation planning process. - Reports to Process Manager.

	• Individual or team carrying out development relocation planning - Integrates the relocation and deployment plan per agreed areas. - Maintain and tracks the integrated area progress. - Monitors and reports the relocation proceeding and for any changes or deviations. - Reports to Project Owner.

3.2 Sub_Activity_B: Create a communication plan and coordinate with the both sides of the relocation.

Sub_Activity_B	Create a communication plan and coordinate with the both sides of the relocation.
Additional Information:	• The communication strategies and plans may need to be modified based on organizational requirements, relocation objectives and strategy, and feedback from stakeholders on communication efficiency.
Description	It is important that the relocation team communicates in an accurate and timely manner. The relocation teams need to communicate to their key stakeholders according to the communications plan to keep them informed. Communications strategies should be implemented early, to ensure that all understand the plans and processes to be implemented in product development relocation and de-ployment. • SWOT analysis to reveal the current state. • Weight of communication: - Completely integrated and documented fully or lighter approach? • Communication methods (check Quality Management framework Stage form for media and mechanisms). • How broad should the information be delivered and interval for the delivery of information. • What are the communication barriers (e.g. cultural differences) and how they can be facilitated.

3.3 Sub_Activity_C: Identify and schedule requirements and commitments that will impact to the product development relocation.

Sub_Activity_C	Identify and schedule requirements and commitments that will impact to the product development relocation.
Additional Information:	• If created prior to the planning, the product development strategy may help to identify sending side requirements and commitments.
Description	The requirements and commitments can include, • The content of the product development to be relocated. • Expected product development deliverables. • Milestones (e.g. planned release deliveries, deployment time lines). • Entry and Exit criteria for each release in product development cycle (build, test and deploy). • Methods for handling any change requests during product development relocation and deployment. • Error handling, correction methods and control. • Requirement for product development environments to be utilized (technical and location). • Environment configuration management. • Asset and system safeguards (logical access controls and restricted accesses). • Product performance and measurements systems and indicators.

3.4 Sub_Activity_D: Map and schedule the product development tasks required for relocation.

Sub_Activity_D	Map and schedule the product development tasks required for relocation.
Additional Information:	• Tasks include product development team Actions, Tools/metrics and Social ties utilized in daily work.
Description	Create estimates of the resources required from the receiving side organization for the relocation of the product development tasks, including

	• Availability of personnel, knowledge, physical environment and technology infrastructure. • Interdependencies within tasks and the receiving side corresponding resources. • Scheduling training and knowledge transfer. • The effort and time needed for teaching and absorbing each task.

3.5 Sub_Activity_E: Identify and plan knowledge sharing and determine training for product development relocation.

Sub_Activity_E	Identify and plan knowledge sharing and determine training for product development relocation.
Additional Information:	• Organization could hire skilled and experienced support to build the knowledge sharing and training.
Description	1. Communicate the purpose and availability for sharing knowledge. 2. Request stakeholders to participate in knowledge sharing. 3. Create knowledge database where the knowledge is kept and maintained. 4. Define the ownership and accountability for the knowledge database. 5. Encourage sharing and the contribution of useful knowledge. -Establish procedures and incentives which include rewards or recognition for improvements for knowledge sharing. 6. Create process for knowledge sharing among stakeholders. -Methods for sharing knowledge include meetings, workshops, hands-on training , electronic materials etc. (Check Knowledge content Maturity Level form for mechanisms). 7. Track knowledge sharing status and progress against the plan, take corrective action when appropriate and follow through to closure. 8. Collect feedback from the stakeholders on the training. 9. Review and make improvements to the training

	based on feedback. 10. Track the effectiveness of training wheatear it has achieved its objectives. (Can be based on teacher or trainees feedback on training, skills, knowledge and performance).

3.6 Sub_Activity_F: Plan performance indicators of the product development relocation to be tracked, and methods used for tracking the defined indicators.

Sub_Activity_F	Plan performance indicators of the product development relocation to be tracked, and methods used for tracking the defined indicators.
Additional Information:	• The organization develops performance measurements and indicators to particular situation in the product development relocation.
Description	• Key performance indicators (KPIs) and targets could include, - Availability of product development during relocation | Product Development downtime measured in time (days, hours, minutes). - Volume of delays in product development during relocation | Relocation success measured in numbers per RA. - Volume of incident/service request reports during relocation | Relocation success measured in numbers per RA. - Volume of support requests from receiving side to sending side | Relocation success measured in numbers per RA.

3.7 Sub_Activity_G: Create a contingency plan for maintaining continuity of product development life-cycle.

Sub_Activity_G	Create a contingency plan for maintaining continuity of product development life-cycle.
Additional Information:	• In matter of immediate return during relocation (e.g. due to resource disappearance).
Description	Contingency plan for possible recall of the product development relocation: • Restore the product development back to its initial stage (Product development life-cycle not hindered or crashed). • When planned, should be tested for viability (successful when tested). • Restore should be able to be executed inside predefined window.

4 Main_Activity: Review of the product development relocation and plan.

3 .Main_Activity	Review of the product development relocation and plan.
Additional information:	
Description:	The product development relocation plan review and approval is done ensuring that the organization requirements are being met by the receiving side organization.

4.1 Sub_Activity_A: Review the product development relocation information for completeness, correctness, clarity, and adequacy in order that it addresses the requirements set on it.

Sub_Activity_A	Review the product development relocation information for completeness, correctness, clarity, and adequacy in order that it addresses the requirements set on it.
Additional Information:	
Description	Review includes, • Physical environment. • Technological infrastructure. • Personnel structure. • Schedule for processes, policies, and procedures. • Schedule of milestones and progress reviews. • Release deliveries and deployment time lines. • Known faults. • Configure management items compatibility at both sides. • The necessary skills and competence to use the plan. • Review the metrics of the product development and to be tracked. • Review the methods used for tracking the defined metrics.

4.2 Sub_Activity_B: Provide the product development relocation plan to the relevant stakeholders for approval.

Sub_Activity_B	Provide the product development relocation plan to the relevant stakeholders for approval.
Additional Information:	Stakeholders may require changes to the product development relocation requirements.
Description	Stakeholders may review product development relocation information, and provide feedback during face-to-face meetings, by e-mail, or by electronic file transfer.

4.3 Sub_Activity_C: Periodically review and maintain the product development relocation plan.

Sub_Activity_C	Periodically review and maintain the product development relocation plan.
Additional Information:	
Description:	• Up to date? Product development relocation plan can be modified due to changes in the agreement, requirements and resource availability of both sides. • Are the plans verified and approved by relevant parties? • Has the product development design changed , or is it appropriate still?

5 Main_Activity: Verify readiness for successful product development relocation to the receiving side.

4 .Main_Activity	Verify readiness for successful product development relocation to the receiving side.
Additional information:	• The findings from verification are listed, refined and included into the detailed relocation plan. • In case there are deviations in the product development relocation, action should be taken to modify the relocation plan.
Description:	Successful relocation is dependent upon the ability to relocate or start up product development at the receiving side with stable and approved plan, and with minimal problems.

	• For existing product development life cycle, it is important to verify product development life-cycle continuity during relocation to the receiving side.

5.1 Sub_Activity_A: Verify that the required communications and interaction mechanisms are in place to support product development relocation to receiving side.

Sub_Activity_A	Verify that the required communications and interaction mechanisms are in place to support product development relocation to receiving side.
Additional Information:	
Description:	Communications should ensure that the planned approach to product development relocation is understood by all relevant stakeholders. • Access to application, information and data is granted and working. • Access to confidential data and documents is allowed and working. • All information, data and documents are transparently communicated to the relocation and deployment personnel. • The mechanisms and media are in place and working (Check Staging form for media and mechanisms). • Required contact lists and escalation lists are generated.

5.2 Sub_Activity_B: Verify that the physical environment is ready for product development relocation (depending where the environment is located).

Sub_Activity_B	Verify that the physical environment is ready for product development relocation (depending where the environment is located).
Additional Information:	

Description:	This can include, • Granted access to building that has been provided to the personnel, space assignments have been made, and furnishings and equipment are in place (e.g. workstations, servers, printers, and required software as well. • Temporary or final environment for equipment and media. • Air-ventilation and heaters in place. • Networking allowed and secured. • Health, safety and security requirements identified and followed.

5.3 Sub_Activity_C: Verify that the technology infrastructure is ready for product development relocation.

Sub_Activity_C	Verify that the technology infrastructure is ready for product development relocation.
Additional Information:	
Description:	The Infrastructure readiness should include at least, • IT equipment and their operating system in place (e.g. wiring, hubs, routers, PBX etc.) • Cabling requirements executed and in place. • Capacity requirements executed and in place. • Power supply verified and backed-up. • Temperature and moisture requirements sorted out. • Networking allowed and secured. • Health, safety and security requirements identified and followed.

5.4 Sub_Activity_D: Verify that personnel are prepared for delivering product development relocation.

Sub_Activity_D	Verify that personnel are prepared for delivering product development relocation.

Additional Information:	
Description:	The Infrastructure readiness should include at least, • Personnel are in place and prepared to deliver. • Resource and skills gaps are analyzed. • Roles and responsibilities have been analyzed and communicated. • Appropriate training and knowledge transfer is planned or completed. • Compensation and reward structure is in place.

5.5 Sub_Activity_E: Verify that procedures, policies, and guidelines are in place and have been communicated to personnel.

Sub_Activity_E	Verify that procedures, policies, and guidelines are in place and have been communicated to personnel.
Additional Information:	
Description:	Depending on the findings of any changes needed, it may be necessary to conduct additional reviews and verifications before initiating the product development relocation and deployment. • Identify and address issues, risks or problems found throughout the verification of readiness.

5.6 Sub_Activity_F: Be prepared to execute the contingency plan for maintaining continuity of product development life-cycle.

Sub_Activity_F	Be prepared to execute the contingency plan for maintaining continuity of product development life-cycle.
Additional Information:	

Description:	Be prepared for possible recall by restoring all hardware, software and data to previous baseline. • Is the contingency plan approved? • Is the recall been tested for viability? • Are there possible Emergency changes to resolve problem?

5.7 Sub_Activity_G: (Optional) Implement product development relocation pilot based on emerged, identified risks.

Sub_Activity_G	Implement product development relocation pilot based on emerged, identified risks (Optional).
Additional information:	• The product development relocations can be moderate to complex in scope. Therefore it could be a good idea to plan and execute a pilot. • A pilot can be used as a trial especially where there are clear expectations and deliverables, and the requirements are well documented. • Piloting may be targeted only to certain part of a product development area (e.g. business critical function of PD) and not to whole scope.
Description:	Piloting can be planned when the product development relocation has high impact and high potential risk, or requires that implementation and deployment approaches be tested and proven. • In case previous experience in the product development skills and competence does not exist, a pilot can be undertaken which serves as an assessment. • Pilot can be more cost effective and faster than multiple trials (less complexity and management overhead).

5.7.1 Create a plan for the pilot.

	Create a plan for the pilot.
Additional Information:	
Description:	1. Consider eligibility of the pilot (is it overall possible to pilot). 2. Consider cost and velocity of the pilot. 3. Plan and decide the size or the area to be piloted (function, feature etc.). 4. Involve personnel who are attached to the full product development relocation and deployment. - Require commitment from involved personnel for supporting the pilot. The pilot typically present extra work to the personnel on top of their daily work. 5.Make sure that the personnel involved are aware on their roles and responsibilities in the pilot. 6.Prepare operational procedures and documentation from pilot environment (modify when necessary). 7.For resilient roll back from pilot, make sure that the piloted release baseline is correct, before deploying. 8. Personnel working with pilot have same components as in full relocation. 9.Collect performance measurements and indicators to compare with the original, running product development environment. 10.Monitor, trace and capture errors and problems early in the pilot environment. 11.Correct as much as errors and problems as possible before the actual product development relocation and deployment. 12. Document the found improvements and communicate those forwards for possible implementation to the actual product development relocation and deployment.

5.7.2 Execute the pilot and track the status progress.

	Execute the pilot and track the status progress.

Additional Information:	
Description:	

5.7.3 Determine actions to take when progress deviates from the pilot plan.

	Determine actions to take when progress deviates from the pilot plan.
Additional Information:	
Description:	

5.7.4 Take defined actions and track them to closure.

	Take defined actions and track them to closure.
Additional Information:	
Description:	• The value of the pilot lies in the objective analysis of the lessons learned.

5.7.5 Update the product development relocation plan based on lessons learned from the pilot.

	Update the product development relocation plan based on lessons learned from the pilot.
Additional Information:	

Description:	• Lessons learned from one pilot can be adopted to subsequent pilots if required. • Benefits, found and fixed faults, enhancements from lessons learned can be adapted to full relocation. • New or corrected functions tested and evaluated in the Pilot facilitates the full relocation progress. • Piloting gives evidence for stakeholder to approve (and facilitates) for full product development relocation. • Acceptance to the planned relocation procedures (and metrics).

6 Main_Activity: Track status and progress of the product development relocation against the plan.

5 .Main_Activity	Track status and progress of the product development relocation against the plan.
Additional information:	
Description:	Information required for tracking includes status reports and possible engagement milestones. • The sending side organization product relocation team should ensure that the relocation progress status is reported by the receiving side as per the agreed terms.

6.1 Sub_Activity_A: Periodically track status and progress of the receiving side implementation of the product development.

Sub_Activity_A	Periodically track status and progress of the receiving side implementation of the product development.
Additional Information:	• The plan may need to be modified based on organizational requirements, relocation objectives and strategy changes, and feedback from stakeholders and personnel on the product development relocation effectiveness.

Description:	The focus in tracking should include at least, • Findings based on the Checklists. • Monitor current status of relocation proceedings. • Record any incidents, deviations and any unexpected events which can impact to the plan. • The progress of the manning status of the key positions. • Knowledge transfer status and effectiveness to unexperienced or newly recruited personnel.

6.2 Sub_Activity_B: Determine actions to take when progress deviates from the relocation plan.

Sub_Activity_B	Determine actions to take when progress deviates from the relocation plan.
Additional Information:	
Description:	Anticipate possible scenarios, and prepare appropriate strategies, plans and do actions to manage deviations.

6.3 Sub_Activity_C: Take defined actions (proactive and reactive) and track them to closure.

Sub_Activity_C	Take defined actions (proactive and reactive) and track them to closure.
Additional Information:	
Description:	In case of deadlock situation in the PD relocation, trigger the contingency plans for continuity of product development life-cycle.