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Katja Nyman

FROM ONE-SIZE-FITS-ALL TO SCALABLE LEAN PROJECT MANAGEMENT

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MASTER'S THESIS | ABSTRACT

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The present master's thesis was commissioned by Bayer Turku. Product Supply IT is a Nordic IT level organization that is concentrating in supporting the projects and processes of Turku Supply Center and act as a strategic partner for Supply Center. The project portfolio and project management is under development at Bayer Turku and it has been identified that one of the reasons for long lead times and unsuccessful projects is the lack of standard processes. Project sizes and time varies from small projects to large investment projects but the standard framework is missing currently.

The aim of the thesis is to investigate what is the value that a portfolio management process would add to Product Supply IT and Turku Supply Center and how those processes should be aligned. The thesis will also gather information how project management differs with different sizes of projects. At the end the thesis is building a scaling matrix for projects and a common framework for Product Supply IT and Turku Product Supply.

In the theoretical part, the portfolio management and the added value of that was explained. The alignment of IT project portfolio and Business portfolio was studied. After portfolio management the project management methodologies and frameworks are studied. The generic approach to project management as well as lean and agile approaches was presented. The project success was studied in detail. Regarding scaling of the projects two methods were presented and studied further.

The data was gathered by conducting theme interviews with Product Supply IT and Turku Supply Center. The theme interviews were selected as the method in order to keep the interviews as flexible as possible.

Based on the theories and interviews a Bayer Project Scale Matrix was introduced. In Bayer Project Scale Matrix, there are two dimensions that define the scaling model: project size and complexity. Based on this matrix a project framework for different category project was introduced. The framework will be implemented to Bayer Turku during the end of 2018 as part of the enhancement project for Project and Portfolio Management.

KEYWORDS:

Project management; project scalability; portfolio management; lean

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YLEISESTÄ PROJEKTIOHTAMISESTA SKAALAUTUVAAN LEANIIN PROJEKTIOHTAMISEEN

Opinnäytetyön toimeksiantajana oli Bayer Turku. Nordic IT:ssä oleva Product Supply IT on IT-organisaatio, jonka tehtävänä on tukea Turku Product Supplyn toimintoja ja toimia strategisena kumppanina myös projektiresursseina. Projektien koot ja kestot vaihtelevat pienistä projekteista miljoonien investointiprojekteihin, mutta toimintatapaa, jolla projekteja johdetaan ja seurataan ei ole yhtenäistetty.

Opinnäytetyön tarkoituksena on selvittää miten PS-IT:n ja Turku Supply Centerin projektiportfoliot tulisi yhdistää ja mitä arvoa tämä tuo liiketoiminnalle. Opinnäytetyössä selvitettiin, miten projektijohtaminen eroaa, kun projektin koko ja kompleksisuus muuttuu. Lopputuotoksena opinnäytetyössä haluttiin rakentaa skaalautumismatriisi ja viitekehys projektijohtamiselle pohjautuen tähän matriisiin.

Opinnäytetyön teoriaosassa selvitettiin portfoliohallinnan strategista merkitystä yleisesti sekä käytiin läpi yrityksen IT-portfolion merkitystä liiketoiminnan näkökulmasta. Portfolionhallinnan jälkeen opinnäytetyössä esiteltiin projektitoimintaa yleisesti käymällä ensin projektin menestystekijät sekä erilaiset projektijohtamistavat läpi sisältäen agile-metodit sekä leanin periaatteet. Opinnäytetyössä esiteltiin kaksi erilaista kirjallisuudessa esitettyä skaalautumismallia.

Opinnäytetyön tutkimusosuus toteutettiin teemahaastatteluilla. Haastattelut toteutettiin alkusyksystä 2018. Metodiksi valittiin teemahaastattelut sen antaman joustavuuden vuoksi. Haastatteluissa haluttiin pitää mahdollisuus pureutua asioihin syvemälle rajoittamatta keskustelua pelkästään valmiiksi suunniteltuihin kysymyksiin.

Tutkimuksen lopuksi teorian ja haastattelujen lopputuloksena rakennettiin sekä projektin skaalautumismalli sekä viitekehysmalli, joka tullaan ottamaan käyttöön Bayer Turussa. Skaalausmatriisi perustui kahteen kirjallisuudessa esitettyyn ulottuvuuteen, projektin kokoon sekä kompleksisuuteen. Näiden kahden ulottuvuuden määrittävät tekijät poimittiin haastatteluista. Näiden pohjalta rakennettiin Bayer Project Scale Matrix, jonka perusteella projektihallinnan tuotokset määritetään. Yhtenäinen projektiohjausmalli tukee Bayer Turun pyrkimystä tehostaa projektitoimintaansa.

ASIASANAT:

Lean-ajattelu; projektijohtaminen; portfoliojohtaminen

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LIST OF ABBREVIATIONS (OR) SYMBOLS

GMP	Good Manufacturing Practices
PBS	Product Breakdown Structure
PM	Project Management
PMM	Project Management Methodology
PMO	Project Management Office
PPM	Project Portfolio Management
PSG	Project Steering Group, a Bayer specific generic steering group for all project categories
PS-IT	IT team that is focusing in supporting the IT needs of Turku Product Supply (PS)
SC	Supply Center
SME	Small and medium sized enterprise
WBS	Work Breakdown Structure

1 INTRODUCTION

Project Management theories have been developed already since the 1950's and nowadays project management is gaining status of an asset in a highly competitive business world. However, also the project management theories are undergoing a transformation from highly structured methods to lean and more agile project methodologies.

1.1 Background

Reading project management related literature, the traditional project management with a waterfall approach is quite commonly compared with more agile methodologies. Business professionals see the waterfall methodology as a slow and old fashioned methodology to run projects. However, it is obvious from past experiences that both of these methodologies have their strengths and weaknesses. (von Behr and Mustikkamäki 2017, 8.) The agile project management is seen as the magic wand that makes all projects successful with less planning and work.

However, the lean methodologies have also been influencing project management for a few years. Lean is not a new idea as it has been used in manufacturing processes since the 1930's. Now it is seen as well that the benefits of removing waste from the process and doing only the things that add value are increasingly becoming a part of project management.

The term "agile project management" is a difficult term as there are many interpretations of what it could mean. There are multiple agile methodologies developed, but what is common in all of them when introduced to a project team is the requirement to change. Not only to change the way of working but also it is required to change the way of thinking. Agile methodologies require a detailed definition of the project framework. As the fundamentals of agile project work are the ability to work independently without direct management, the rules must be however defined. The agile way of working is built on trust. (Järvi and Kosonen 2017, 12-13.)

In agile methodologies, one of the biggest changes in the roles is the lack of a project manager. For people that have a long history as project managers, this change might seem very frightening. However, this change does not mean that project managers are not needed! As stated by von Behr and Mustikkamäki (2017, 8 – 9), there is still a need for waterfall project management methods and project managers have a high priority role in the success of the project.

Project management culture is also undergoing a change as the project management is more and more seen as a strategical asset. Projects are the top priority when a business strategy is being implemented. Young et al. (2012, 889) states that a strategy should be the biggest reason when large projects are considered. That is if the business is doing the right things. If

there is no linkage between the business strategy and projects, it is obvious that the business cannot meet the strategical needs.

1.1 Bayer as a company

Bayer is a Life Science company with a more than 150-year history and the core competencies in the areas of health care and agriculture. Bayer group consists of four fields of expertise: Pharmaceuticals, Consumer Health, Crop Science and Animal Health. In Finland Bayer is concentrating the most on Pharmaceuticals. In Turku, Bayer has the production site of a blockbuster product for Inner-uterine contraception, the so called Mirena-family. The sales of Mirena-family exceeded 1 Billion in 2017. Bayer has a specified the company purpose to be “Science for a Better Life”. The focus on the company is to develop better medicines and high-quality food. (Bayer internet site 2018.)

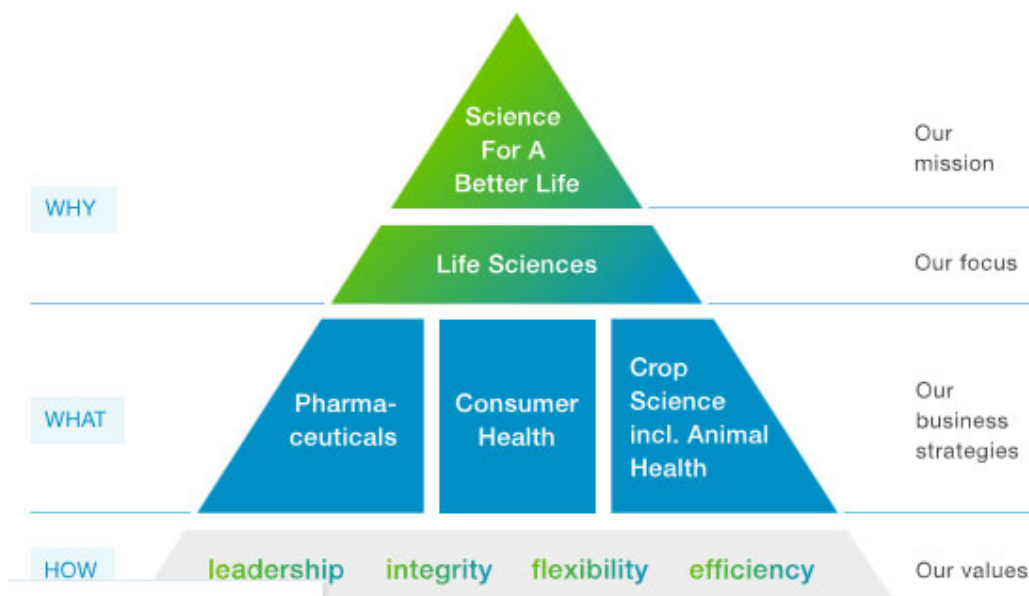


Figure 1 Bayer strategy (Bayer Internet site, 2018).

In Turku Bayer has two legal units, Bayer Oy and Bayer Nordic SE. In total, about 700 people work at the Turku site. Bayer Oy is a Supply Center which is producing the medical products for world-wide sales. Bayer Nordic SE is the Nordic level Corporate Platform with supporting functions like Sourcing, Legal, Accounting and IT. In Nordic IT there is a Product Supply IT (PS-IT) team that is fully concentrating in supporting Turku Supply Center with its IT requirements.

PS-IT team members are resources yearly in tens of projects and there are about 15 projects running at the same time. For year 2019 already over 30 project ideas and requirements are identified. Project size varies, however most of the projects are small and medium size projects. What differentiates PS-IT projects from a standard Project Management practices is

the linkage between Bayer Oy and PS-IT projects. As a supporting function PS-IT is often linked to Supply Center Turku (SC Turku) projects. In those projects, PS-IT has named IT project manager that is taking care of IT requirements in the project even though the project itself is run by a SC Turku project manager. Nevertheless, PS-IT has projects that are solely IT projects without any direct linkage to SC Turku PMO, but requires some resources from Supply center resource pool.

1.2 Scope

Running projects is a business critical issue for ensuring the success in a current business world. Projects should be started based on the strategy importance and run through efficiently and then released to normal business processes. However, the current way of how projects are started and selected at Bayer does not fully support this business criticality linkage requirement.

The thesis starts from the point where Bayer PS-IT has realized that project management culture could be further developed. The project world at Bayer Nordic PS-IT in Turku is becoming more complex. A more efficient way of working is seen as a priority requirement in order to be able to support Supply Center Turku at the level that is expected in order to keep the production running with ever rising speed. How can we ensure that Bayer Turku can deliver projects and services with the required speed and quality?

The way of working in PS-IT projects is not currently structured at the adequate level. PS-IT work in projects is mainly ad-hoc work as transparency to the project plan is missing. The gates from Project Initiating to Project Executing are fairly low and the structure of standardized project management is missing. There are no templates that would be used in all projects, the planning of the project is done on a very rough level and the feasibility of the project is not analyzed. All project managers are inventing their own wheel when a project is started and this cause occasionally more work if a specialist is working in multiple projects and is trying to figure out where the information is and how it should be managed. It could be said that the PS-IT projects are started with minimal bureaucracy which, nevertheless, is leading into situation where the through-put time is in most cases much longer than planned and the success rate of the projects is quite low.

The Project Management Office (PMO) has been established briefly and the process to select and scan projects based on their strategical meaning for the company is under development. However, there are multiple project ideas that are coming from Bayer Oy's strategy so the strategical linkages exist. Prioritization of the IT projects is typically done by the head of department at Nordic IT based on the experience and intuition rather than on a structured evaluation process. There are however multiple simultaneous projects running and even more projects on the pipeline and therefore the requirement for the PMO is evident.

The complexity of the project management and PMO processes on PS-IT derives from the linkage between Supply Center Turku and Nordic PS-IT. The process for PS-IT should be applicable to other IT related Nordic-wide projects as well and at the same time it should be designed to support the Supply Center's Project management process which is also under development pressure for the same reasons as PS-IT: a high number of projects which are not properly managed. The overlapping of the Portfolio and Project Management processes is visualized in Figure 2 Linkages between Bayer Nordic SE and Bayer Oy Portfolio and Project Management.

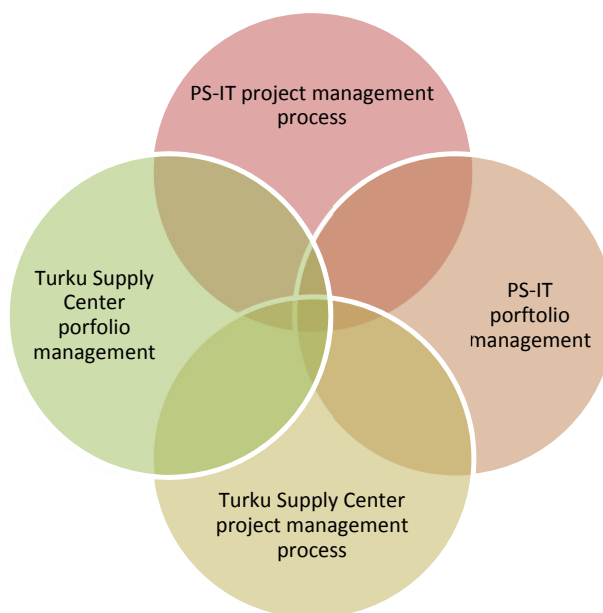


Figure 2 Linkages between Bayer Nordic SE and Bayer Oy Portfolio and Project Management

The purpose of this thesis is to develop a lean and more agile and scalable project methodology to support the most critical phases for project success: From the project idea through project initiating and planning until the project is released to execution. Project execution is only briefly mentioned where necessary as the project execution process is already under development. In order for Bayer to select the best way of working it is required to understand the weaknesses and strengths of different project methodologies. As the project size in PS-IT varies, this study builds a project management matrix. This matrix will help to decide what kind of documentation and management is required to support the successful project execution. The matrix will standardize the project management methodologies used at PS-IT. All this aims at lean and efficient project management with a higher success rate.

Lean, in all its aspects, is a philosophy that one cannot avoid in the current business world. Making the work leaner, removing all waste from the process, and concentrating in areas that add value to the process or to the product in question, are a hot topic. These are sales phrases that no business can resist. However, how can this be then implemented in Bayer IT project management when the projects are run without a proper management or structure? The

project management framework must be comparable also for Turku Product Supply project framework in order to lean the work on that area as well.

The study will also develop a process to ensure that the Turku Supply Center and PS-IT project portfolio is managed based on the strategical needs for PS-IT with the linkage to Supply Center Turku's PMO.

In order to meet the scope, the thesis aims to answer the following questions

- What is the value that portfolio management adds to PS-IT and Turku Supply Center?
- How the Portfolio Management processes at PS-IT and Bayer Turku could be aligned?
- How project management differs with different sizes of projects?
- What is Lean in project management context?
- How should the projects be scaled with a matrix to find a suitable level of details in project management?
- How the project management framework could be aligned for PS-IT and Turku Product Supply?

1.3 Research structure and methodology

The selection of the research strategy and research methodology is based on the research problem. The research methodologies in general are divided into quantitative and qualitative methodologies. Qualitative methodologies create deep understanding regarding the issue but that is usually difficult to generalize, and quantitative methodologies create shallow yet more reliable information. (Ojansalo et al 2015, 121.)

Quantitative methodology is usually a formal questionnaire where a large number of respondents are asked the same questions. Typical quantitative methodology is theme or group interviews. (Ojansalo et al. 2015, 104 – 105.) It is seen that quantitative and qualitative methodologies are supplementing each other and can be used also in the same research (Hirsjärvi et al. 2007, 132 -133).

In this thesis, a qualitative methodology is selected as the primary source of information as the aim was to gather the development needs from the specialists who are part of the project process at PS-IT as well as part of the project portfolio in PS-IT and Bayer Oy.

The thesis is divided into two sections. The first section concentrates on the theories. In this part, the thesis will give a wide perspective to project and portfolio management from a project idea until project execution. Theories regarding lean and agile project methodologies will be analyzed and the project size aspect to project management methodology is presented as well.

Based on the theories presented in academic articles and books, the interviews were conducted to explore if the specialist on PS-IT have the same view on the development needs

and importance of project and portfolio planning in the lean context. The second section of the thesis focuses on building a framework and suggesting a new process for initiating and planning projects at PS-IT with alignment to the Turku Product Supply project management framework.

2 PORTFOLIO MANAGEMENT

Project Management Office is responsible for Project Portfolio Management. Project Portfolio Management is defined to be concerned of managing groups of projects, programs, and operational activities. The projects compete for scarce resources and aim to achieve strategic business objectives. (Enoch 2015, 1.)



Figure 3 Portfolio management at organizational context (Enoch 2015, 48).

Enoch (2015, 47) explains that the Project Portfolio planning and management has a close connection to the organizational strategy which is reflected on projects that are running as well as to management of on-going operations. Project Management Office is required when multiple projects are running simultaneously and alignment between different projects is needed. Figure 4 shows that elements People, Process and Tools are essential to guarantee Project Management Office success. (Bonham 2014, 90.)



Figure 4 Essential elements of a project management office (PMO) (Bonham 2014, 90).

The problem with the portfolio management is the complexity of the project base. It might be thought that only the most business beneficial projects should be run but it is essential to find the balance for the project portfolio. Therefore prioritization is needed. The objective for the portfolio management is to find the optimal set of projects and timing of the projects in order to achieve the organizational strategy objective. (Enoch 2015, 8.) In most methods for prioritization, the focus has been in maximizing the benefits and business alignment. However, it might be needed to have projects without direct business benefit in the portfolio. In IT for example, an architecture development might be seen as one that does not have direct impact on business success but is essential part of the IT project portfolio. (Bonham 2015, 194 – 195.)

Bonham (2014, 196 – 197) suggests that in order to have a good prioritization process regarding the IT project portfolio, two types of reviews for prioritization are needed: the IT initiative review and the IT project audit process. First, the initiative reviews are held to determine the selection and rough resourcing of the projects and second, once projects are started, the project audits are held to determine and align the project timetable and gates. In both reviews, the review team compiles a prioritization list that is then presented to the executive review committee.

Project prioritization should be based on multiple criteria. The standard method to prioritize projects does not exist and instead the prioritization process should be tailored to the company in question. There are qualitative and quantitative measures to be considered. First in the *initiative review* prioritization measures can vary as well on the company size. In larger companies, the qualitative methods such as the organizational and cultural fit might be more important. In smaller companies, the quantitative methods, such as near term cash flows are in a bigger role. In *the project audit*, the prioritization is done to find the healthy projects that are aligned with the corporate strategy. The audit should be aiming to focus on the progress of the project rather than the scope of the project. (Bonham 2014, 197 – 203.)

2.1 IT Project Portfolio Management

The Project Portfolio Management has been studied since the 1970's. However, the IT projects and programs differentiate from other non-IT projects and programs. IT Project Portfolio should be selected with the consideration of the satisfaction of the stakeholders. The added value of IT projects to the business stakeholders is the key that IT PMO should keep in mind. However, it is also crucial for the Project Portfolio Manager to ensure that the selected projects support the strategic initiatives. The issue with this approach is that the corporate strategies might change and that will then impact the IT Project Portfolio as well. (Bonham 2014, xiv-xv; 17 – 18.)

According to Bonham (2014, 23 - 25) despite the separation and different functions of IT projects, the IT project portfolio should be a part of corporate project portfolio management as well in order to align the IT projects with the corporate strategy. Bonham explains that IT projects should be considered as support for business initiatives and not pure IT initiatives.

Figure 5 illustrates the complexity of the IT Project Portfolio Management in the business context.

1. Corporate strategy defines how the resources should be allocated.
2. In some companies the corporate strategy is refined by developing business unit level strategies.
3. These business unit level strategies are developed into detailed plans which might be a portfolio of ideas for projects.
4. The project ideas are then periodically reviewed in order to see which projects should be started.
5. Project Portfolio is then maintained through the cycle of “decision making, prioritization, review, realignment and reprioritization”. (Bonham 2014, 17 – 19.)

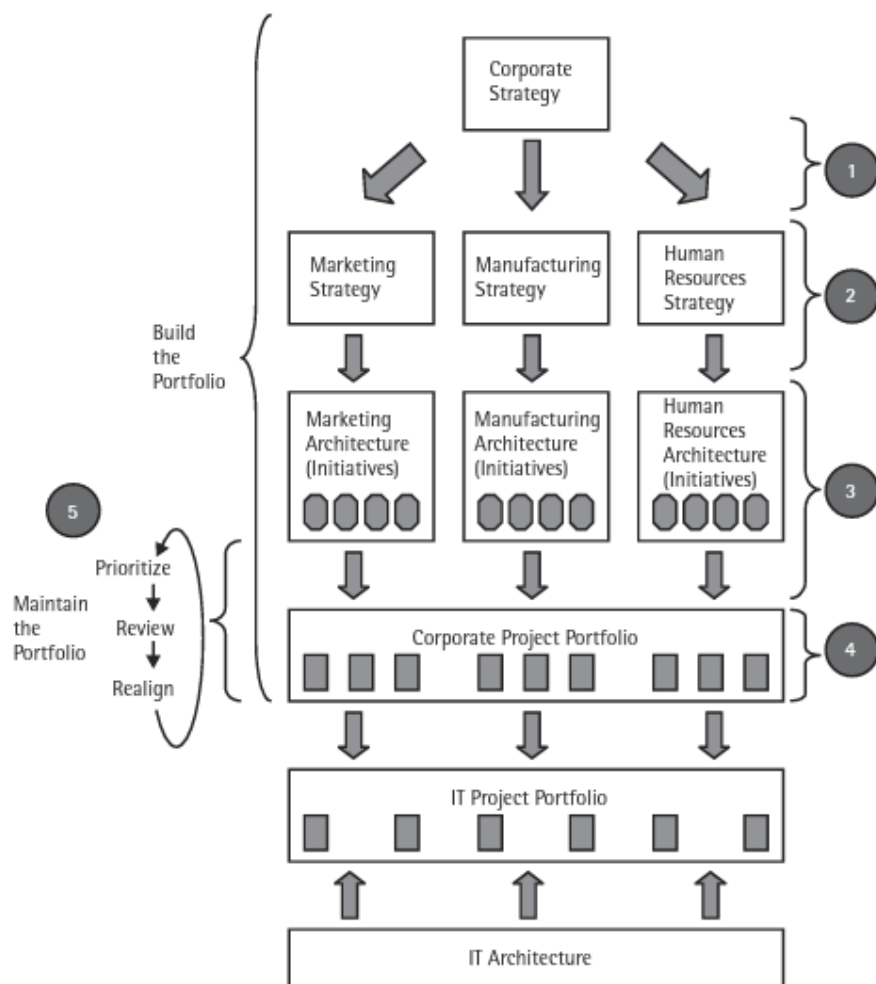


Figure 5 IT and Corporate Project portfolio and strategic alignment (Bonham 2014, 18).

As Bonham (2014, xiv; 44) states, the IT project portfolio is always under the pressure of change of corporate strategy. The projects can be started based on the strategy and the end result of the project would benefit the current strategy. However, if the strategy changes the project might become obsolete. Nevertheless, it is also possible that if the strategy changes during the project, the project scope might be changed to support the new strategical insight.

2.2 Project Portfolio Diagrams

Balancing the project portfolio is important for the vitality of the business. The IT project portfolio does not differ from this despite the connection to the business project portfolio. The

projects in the portfolio should be categorized, for which there are multiple ways to do categorization. Bonham (2014, 211) suggests that the portfolio is split into three different budgets: utilities, incremental upgrades, and strategic investments. The categorization and prioritization metrics should be built based on the company structure and therefore no standard can be given that would suite all needs of businesses.

Visualization of the selected prioritization model is seen as a benefit and there are multiple ways to visualize the decision making. In Figure 6 one project is visualized based on the selected decision criteria. In order to compare projects with each other, multiple spider diagrams need to be compared. (Bonham 2014, 211.)



Figure 6 Spider diagram of one project based on the selected criteria (Bonham 2014, 216).

However, it might be important to see multiple projects in one diagram in order to compare them easily. The axis of the diagrams can be developed based on the business needs. In Figure 7, the axis has been selected from the risk point of view. How attractive the end product is and how easy the end product is technically. (Bonham 2014, 216.)

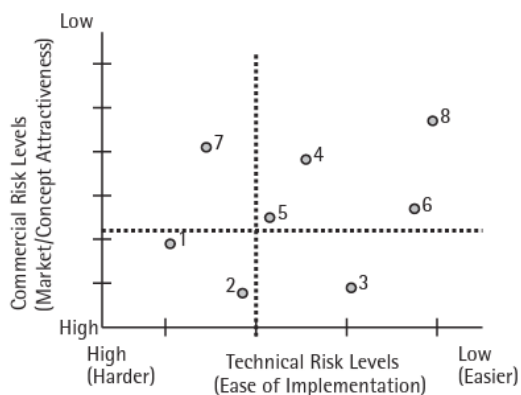


Figure 7 Diagram of project prioritization on commercial risk levels and technical risk levels (Bonham 2014, 216).

Important to remember is that the diagrams are only serving as tools that enable decisions. The decision about what metrics to be used and how those are prioritized depend on the company and its strategy.

3 PROJECT MANAGEMENT

Project Management has been developed since the 1950's. Nowadays the project environment is dynamic as the speed of development is continuously rising. Collyer and Warren (2009, 356 – 357) state that the dynamic project environment has an impact on the project management methods. They mention that in the guide to the project management body of knowledge (PMBOK) the progressive elaboration is used, which means that the planning is done on more detailed level when the project progresses. However, they state that in the rapid environment there are more unknowns which make the planning more challenging. For these kind of projects there is a need to create a new set of controls that can be changed during the project execution.

Figure 8 presents the differences in the project types in a dynamic environment. The Project B, which can be for example a classical house construction project, has more unknowns in the beginning but as the project progresses, the planning is done on more detailed level and the success of the project can be more predictable. The project C, which can be for example a new software for a customer, has a high level of unknowns in the beginning and the requirements might change during the software development. Therefore the planning can not be done much beforehand but must be done in detail during the project execution. (Collyer and Warren 2009, 356.)

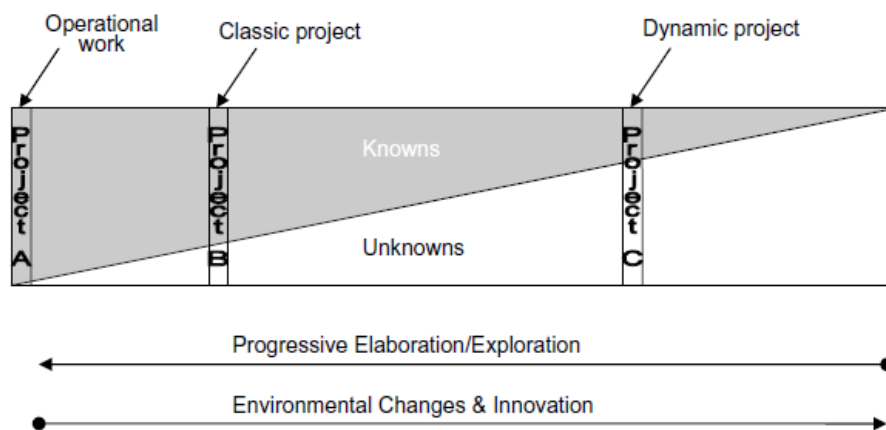


Figure 8 Project types and dynamic environment (Collyer and Warren 2009, 356).

The project managers must be able to handle the dynamic environment. The management of dynamic environment can be anything from rejecting any changes to the project scope, to using prototyping to ensure the project success. Multiple project management methodologies are developed to support the dynamic environment. (Collyer and Warren 2009, 359 – 360.)

Agile methods are quite often seen as the key solution to improve the project success. However, as already stated in this thesis as well, it is clear that not all projects should be run

with agile methods and the traditional waterfall methods have their place. Azanha et al. (2017, 121) present in their study a figure (Figure 9) where the selection of agile versus more traditional project management is done based on the type of the project and the organizational structure.

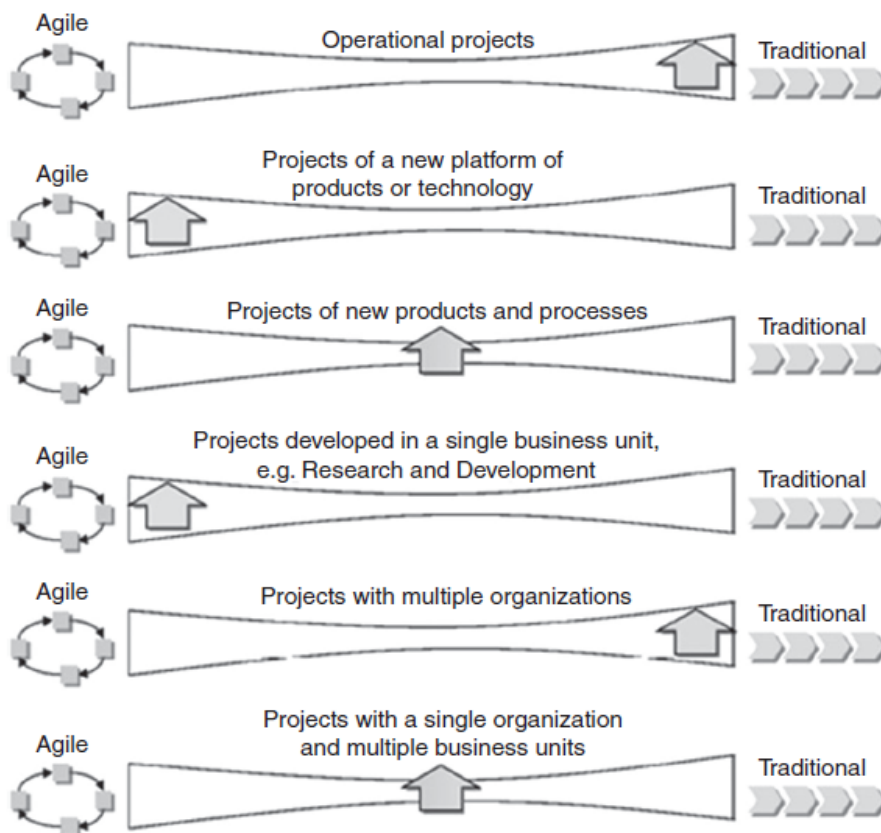


Figure 9 Agile methodologies vs traditional methodologies (Azanha et al. 2017, 125).

In this thesis first the project success will be analyzed after which the methodologies will be gone through. The lean principles in the general are then presented and after that the focus is on project management. First the most traditional, the waterfall methodology will be presented. Second, Agile methodologies are explained and on third it will be described what Lean means in the context of the project management.

3.1 Project Success

The success of projects has been researched heavily. However, the “success” is not defined in a way that all researches would have the same understanding of what is meant with the “success of a project”. There are two successes to be defined. The first is the *project success* which in the Joslin and Müller study (2015, 1377) is defined to be the success against the

project objectives which are then turned into the outputs of a project. The second is the *project management success* which is defined based on the success criteria. The standard presentation of a project success is known as the Project Triangle presented in Figure 10 where the success factors are time, scope and cost.

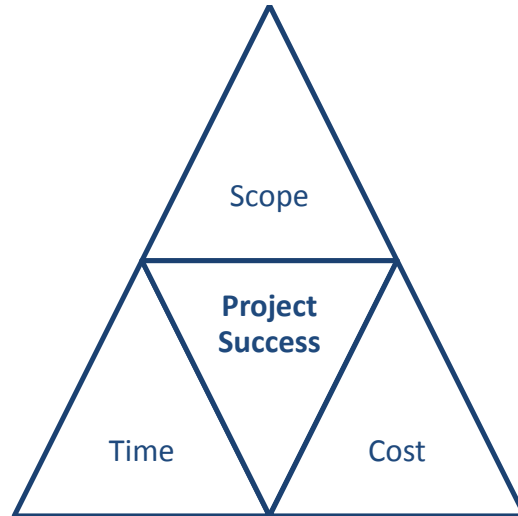


Figure 10 The Project Triangle of Project Success Factors

However, the standard Project Triangle has been seen as insufficient for the current project world. Also the Resources, Quality and Risk should be taken to count when the success factors of the project are considered. Figure 11 explains the enhanced project success triangle as two overlaid triangles, where the project input/output factors relate to the project process. (Project Management Triangle.)

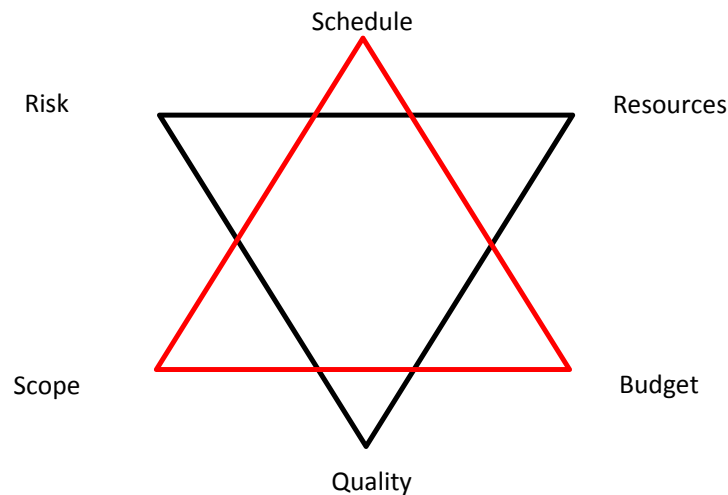


Figure 11 Enhanced Project Success factors (Project Management Triangle).

One of the success criteria for a project management success is the selection of the Project Management Methodology (PMM). The selection of the Project Management Methodology is done to increase the chance of success and project efficiency. There is multiple PMM's available, for example world-wide used PMMs PRINCE2 and PROPS to mention few. However, it is seen that the standardized PMMs does not fit all purposes but instead a customized PMM might enhance the project effectiveness. (Joslin and Müller 2015, 1377 – 1378.)

According to Joslin and Müller (2015, 1378 – 1379) the incompleteness of PMM is in relation to the project efficiency, quality and through that also to the project success. Joslin and Müller mention that it has been stated in the literature that “one size fits all” does not work in the project management and there are studies to support that the project success is higher when the project procedures are tailored based on the type and size of the project.

The question how much of the project management should be standardized and customized might be a difficult challenge. However, the more critical factor for the project success according to Joslin and Müller (2015, 1380) is the incompleteness of PMM. It was stated that if the organization had an incomplete PMM, the project managers would tailor a project specific methodologies.

3.2 Lean

Lean has been developed already in the 1930s but the word Lean was first mentioned in the article *The Triumph of Lean Production System* in 1988. Lean is seen as a management system that includes also research and development, vendor management, customer support and the full company management. (Torkkola 2016, 13.) In this chapter the general lean principles are described which then in chapter 3.4 Agile and Lean Project Management methodology are combined with agile project management context.

The purpose of Lean is to maximize the customer value and minimize the waste. The flow optimization is the key to achieve the optimal flow of the process.

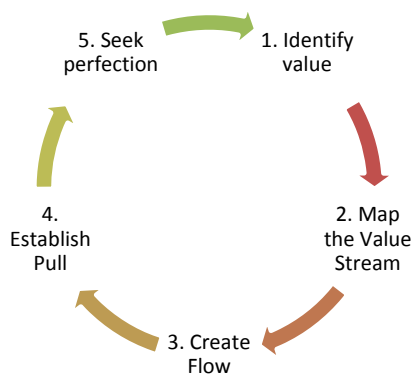


Figure 12 The 5 steps process for lean techniques (What is Lean, 2018).

Figure 12 describes the Lean Principles with 5 simple steps:

1. The value is identified from the end customer's standpoint.
2. All process steps are identified and examined and the steps that do not add any value are eliminated.
3. The flow of steps that add value are in a tight sequence so that the product or service is delivered to the customer smoothly.
4. The customers are pulling value from the next activity.
5. When the value is known, the value streams are specified, the waste steps are removed and flow and pull are in the place, start again and continue until perfection is reached. (What is Lean, 2018).

Lean in general is usually connected with manufacturing industry. However, according to Torkkola (2016, 220-222) also specialist work and services can be lead with Lean principles. Lean can therefore be used in project management work, which then increases the learning and the quality of the services or solutions the project team delivers through continuous improvement.

Continuous improvement

Continuous improvement is the key element for change. The PDSA cycle (Plan-do-study-act) in Figure 13 is seen as a method which enables the change. With this cycle, new information is created by testing and learning.

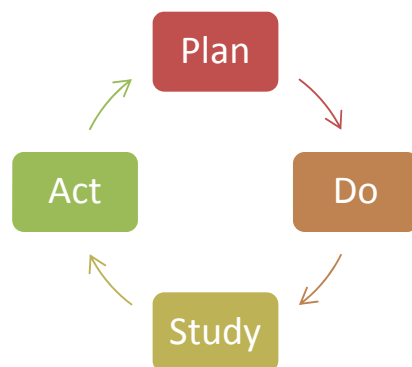


Figure 13 PDSA Cycle (Plan-do-study-act)

1. Plan: in this phase there is an improvement idea, which would need to be tested and testing requires planning. Planning means
 - The definition of the hypothesis: what is expected to happen?
 - Building the measurements
 - The definition of success of the hypothesis

2. Do: What would be the minimum test that would create more information regarding the hypothesis? Keep it simple!
3. Study: Was the test successful? What went wrong? What new did we learn?
4. Act: Should the change be implemented wider? Should it be further developed? Should the idea be forgotten? (Torkkola 2016, 39 – 43)

For continuous improvement the cycle speed is the key. The faster the cycle is run through, the faster is the improvement. The cycle will not work fast enough if the defined tests are too big. The most important thing is to always learn from the past cycles. (Torkkola 2016, 39 – 43.)

Resource efficiency vs. flow efficiency

Usually in the business world it is thought that the resource efficiency is the most important thing. This means that the scarce resources are always as booked as possible. For example, when buying an expensive production machine, it is wanted to be fully used to respond to the used value (money) when it was bought. However, in lean it is thought that the flow efficiency is more important. (Modig & Åhlström 2018, 8 – 21.)

To consider the efficiencies, it is required to understand how the efficiencies differ. In Figure 14, two efficiencies are visualized. For example in Medical industry a Computerized System is updated and a validation report is needed to be filled and signed. In the resource efficient way everyone in the process does their work and hand it over to the next person in the workflow. However, in the flow efficient process the people will work as a team to complete the task without any waiting time to improve the flow.

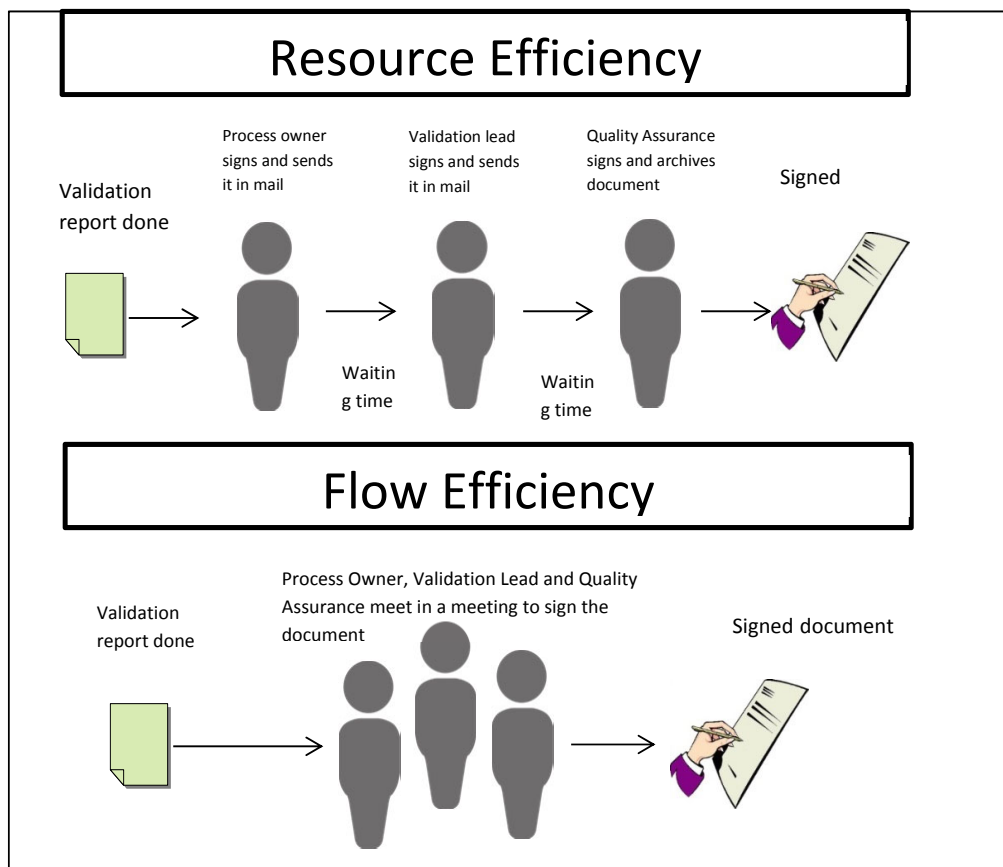


Figure 14 Resource Efficiency vs Flow Efficiency

In general, Lean can be applied to Project Management work but requires change of mindset. The manager has to pay attention to areas that might have been with lower priority before:

- The communication between the different process areas is important and this requires to be interested what people have to say
- PDSA cycle is important to create new and learn from the past
- Setting goals and measuring the progress
- Coaching and training in order to have better performing individuals in the team. (Torkkola 2016, 226-229.)

3.3 Project management methodologies

In this chapter first the traditional, the so called waterfall methodology is presented. Second the principles of the agile project management are presented and third the lean methods in project management are described in more detail.

3.3.1 Traditional “waterfall” methodology

The traditional methodology is the so called waterfall methodology. Project Management Institute’s Project Management Body of Knowledge, PMBOK, is an internationally recognized framework for managing projects. PMBOK describes Project Management process to be a four phased process where the project starts from the Project Initiation phase and the last phase in project is the Project Closure. (Snyder 2013, 5.)

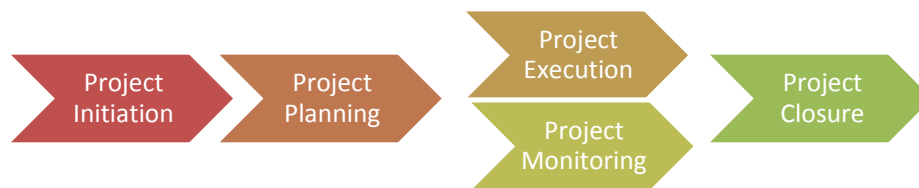


Figure 15 PMBOK project process (Snyder 2013, 5.)

- *Project Initiation* is the first phase and in this phase a project sponsor has the biggest role. In the initiation phase, a project charter is created by a project sponsor and project manager can support the work if already nominated. A project charter gathers into one document for example the project description, high-level requirements, a list of stakeholders and a business case of the project. Before a project can move to the Planning phase a meeting is required to decide whether the project should continue the work.
- *Project Planning* is the second phase and this should be the most critical one. In the planning phase all the details of the project should be gathered and analyzed. The refinement work continues until the project closes and this is called the progressive elaboration or the planning wave which mean that the near future is planned at more detailed level and the uncertainties will be handled when the process is further. In Project Planning phase multiple documents are created to support the successful management of projects. These documents consist of for example a communication plan, a stakeholder management plan, a risk management plan, a project schedule and cost planning.
- *Project Execution* is the third phase and in this phase the created plans should guide the work in the project. For example communication should be done based on the communication plan created in the planning phase. The plans can still be revised if required in order to support the process. The project deliverables are created in the execution phase.
- *Project Monitoring* is done parallel to the project execution. In this phase, the project performance regarding the scope, time and cost are monitored.

- *Project Closure* is the final phase of the project process in PMBOK. In this phase, the project deliverables are accepted and the project team performs the lessons learned. The project team is released and the project work is ended.

In the waterfall methodology, the phases do not overlap and it has a high level of planning and process control. The waterfall methodology is seen the most suitable for projects that have well understood scope. In environments where high levels of unknowns exist, the failure risk is higher. Especially when the flexibility to adapt to changes does not exist. (Collyer and Warren 2009, 360.) Also Snyder (2013, 9) states that projects are unique by their nature and therefore PMBOK process is not the most suitable for all projects.

3.3.2 Agile methodology

Rasnacis and Berzisa (2015, 18) suggest that especially in IT projects the failure rate is high due to the Project Management approach that companies use. According to them the strict project management processes guide people to be more concerned about how they do the work instead of how to accomplish the goal of the project. There is insufficient attention to the emotional and social factors of project management.

According to Bonham (2014, 60 – 62) the change in the strategy that affects IT projects is high and therefore risk management is essential in IT Project Management. The risk of scope changes requires the IT projects to be flexible. Therefore the need for the agile project methodologies has arisen. Aiming at a moving target is not possible if there is no flexibility in Project Management and scoping of projects. For these requirements the agile project management framework is developed.

There are many agile frameworks available. In this thesis, the Scrum is selected as an example of agile methodology. Reason for this is that it is widely used and many studies have been written about it. Agile methodologies, in this case Scrum, are the most efficient if the project is complicated and has to adapt to scope or requirement changes during the project lifecycle. The biggest difference between the traditional project management method and agile method is the change of mindset: the team members take the responsibility to plan and deliver, and there is no project manager available that would control the work. (Bonnie 2014.)

The scrum has a few characteristics that will be explained first. After the characteristics, the roles of the scrum process will be presented.

- *Product backlog* is a list of requirements for the product, for example software, the customer has. From the backlog the tasks are taken into a sprint.
- *Sprint* is a timeframe, usually from 2-4 weeks, during which tasks selected for the sprint will be performed.
- *Sprint retrospective* is a meeting where the sprint is reflected and the sprint team can learn from past experiences. (Saddington 2012, 14 – 15.)

In the scrum process there are three main roles:

- *Scrum Master* is there to help the team to be independent and self-driven. A Scrum Master has the role to remove barriers from team progress, and act as an intermediary between the team and organization. A Scrum master leads the daily Scrum meetings.
- *Product Owner* is the voice of the customer. They will present the requirements from the customer and decide what the scrum team works next and makes sure that the team effort is focused on the most valuable tasks. However, the product owner is not a project manager, the Scrum teams are self-organized.
- *Scrum team* is a cross-functional team that has the knowledge and skills to deliver the required final product. The team has only one project at the time and the team members work full-time for that project. The Scrum team decides by themselves what requirements from the Product owners list they can accomplish in a sprint and plan accordingly. (Bonnie 2014.)

In the scrum process the customer has a need, a vision of the final product. Usually in agile projects the need is software, but nowadays agile can be used in other projects as well. The end product is split into pieces and the product owner is prioritizing the requirements. The requirements are selected for a sprint based on the priority by the team. The team itself defines how many of these requirements they can deliver in a sprint. (Bonnie 2014).

During a sprint, the team has daily standups. During these 15-minutes meetings everybody reports, what was accomplished the day before, what is planned to be done today and if they have any restrictions that hinder them working efficiently. The Scrum master is taking care of these issues, if those exist, in order to ensure the efficient flow in the work. (Bonnie 2014.)

After the sprint, the sprint result is reviewed by the team and the product owner. This ensures the transparency of the agile process. It is also essential that the process and the ways of working are reviewed to see if there is some room for improvement required in order to ensure better quality. This process is called retrospective in Scrum. If there are still some requirements that the customer sees essential, the sprint planning starts from the beginning based on the revised requirement list. (Bonnie 2014.)

3.4 Agile and Lean Project Management methodology

In project management, Lean has been studied as well. According to Feldman (2012, 29) lean in project management encourages projects to fail fast. It is leaner to focus to the outcome of a project and whether that project should be even executed. In lean project management the results are measured and challenged through the build-measure-learn loop. The project should question that is it fixing a problem or creating business value as it should? In lean project management the north star is always in the business buy-in: is the project done for worthy cause.

All that is said regarding lean project management apply also for agile project management. Agile projects are using PDSA cycles and having a purpose to learn and fail fast. However, lean methods can be used also in waterfall projects to ensure the flow.

Efficiency in project management has been studied in regards to Lean methods. It is more efficient for the project teams to work as one team instead of splitting them into smaller teams and then combining all together at the end. It is flow efficient to have a project team working together. This also increases the communication level of the project team, which then improves the project results through constant feedback. (Jalali et al. 2016, 256.) In Gabriel (1997, 206-208) study the successful result for the lean approach in project management in the multi-organizational project, was agreeing on paper the project management principles and project manager acting as a single point of contact. In a successful lean project, the project manager also had the authority to make decisions.

However, splitting work into smaller batches is leading to better understanding about the goals of a project. The splitting work approach is increasing the experience of a project manager as quite a few project managers have experience from large projects but have experience from small projects. Dividing a large project into smaller mini projects is making the project management easier for a project manager and increasing the knowledge of project manager. (Jalali et al. 2016, 256.)

To reach the goals of lean, it is essential at the beginning of a project for a project manager to involve the project team early on to plan the project as joined effort. Working together increases the awareness of the scope of the project but also awareness of what other project team members are doing. With this, the communication within the project team increases and it correlates into better project results. (Jalali et al. 2016, 257.)

4 PROJECT MANAGEMENT SCALABILITY

In previous years it has been the general assumption that a common project management approach should be used regardless of the type or the size of the project. Payne and Turner (1999, 55) state that the following advantages of having a common approach have been identified in the literature:

- Consistent reporting which is also comparable between different projects
- Resource calculations and capacity constraints are more consistent
- Resources can be moved from project to another more easily as the management style is the same in all projects
- Project managers can use smaller projects as training ground when managing larger projects.

However, in their studies, Payne and Turner (1999, 55 – 56) found that it was actually the opposite: the common, standardized procedures despite the project characteristic were less successful than the projects where the procedure was tailored. Also Bonham (2014, 78 – 79) state that the project methodologies should be flexible to support all types of projects but should have a common structure to ensure the required details for successfully running a project.

PMBOK, PRINCE2 and ISO 21500 are the most common project management standards. These standards create the best practice for project management with detailed processes. However, all of these standards recommend that the standards are tailored to individual projects. (Ahonen et al. 2015, 206.)

Payne and Turner (1999, 56 – 57) discovered in their study that the size of the project and the used procedure correlated with the success of the project. They found out that with medium sized projects there was no difference in success whether a standardized process was used which led them to make assumption that the standardized processes are designed considering medium sized projects. With small sized projects the success rate was higher if the project management process was designed for smaller projects.

Jalali et al. (2016, 253) suggest that tailored management methods are needed due to different size, complexity and uniqueness of the projects and the traditional project management methods are no longer efficient at the current dynamic environment. However, according to Ahonen et al. (2015, 205), there is always at least some project management effort that needs to be done despite the project size. Here the project size is related to project length or the project team size. The minimum a project or a complex task requires an effort estimation and the task list in the form of work breakdown structure (WBS).

In this chapter, first the possible differences of projects regarding the size are investigated and second, project scaling is described with two different scaling models.

4.1 Small- and medium sized projects

In study Turner et al. (2012, 950) discovered that a size of a company correlates with the size of projects. In the study, they suggest that the project size equals the length of a project and no other characters of project size are considered. This correlation can be seen from Figure 16 where the length of a project was studied against the size of the company. The size of the company in the study was based on the amount of employees. Other way of thinking the size of project is done through resources required. Small projects have limited amount of resources to be used for project management purposes (Schei 1990, 42.)

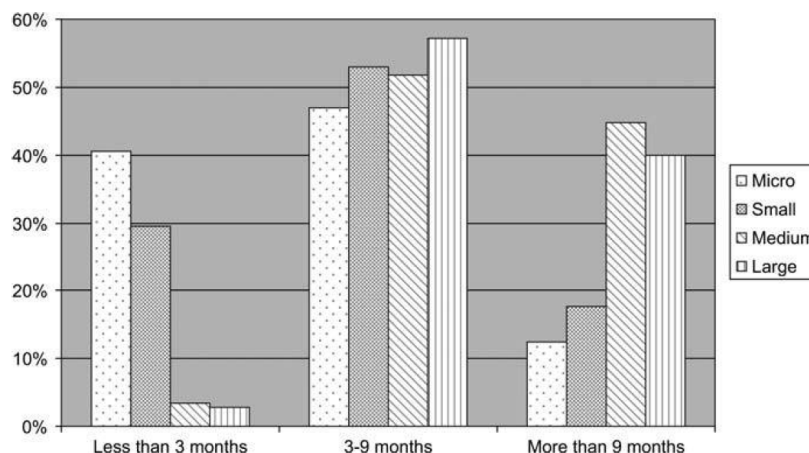


Figure 16 Project size by company size (Turner et al. 2012, 950).

In PRINCE2® small project is defined with the characteristics of Time, Costs, Scope, Risks, Quality and Benefits. In Figure 17 the definition of small and large project based on PRINCE2® is described. (Ferguson 2011, 7.)

Tolerance area	Small project	Large project
Time	Short term	Medium to long term
Costs	Less than a value defined by the organization as appropriate for their business	More than a value defined by an organization as appropriate for their needs
Scope	Simple and well defined. Stable dependencies	Complex and vague. Dynamic dependencies
Risks	Low risk, modest changes, failure a local difficulty	High risk, major changes, failure a major disaster
Quality	Fit for purpose. Single discipline	Complex, multi-discipline
Benefits	Direct from the project and clearly defined. Single sponsor	Related to other projects and hard to pin down. Multiple sponsors (Board)

Figure 17 Characteristics of small and large projects in PRINCE2® (Ferguson 2011, 7).

Kozłowski and Matejun (2016, 38 – 40) studied small and medium –sized enterprises as well, to understand if there are characteristics that differ in project management in larger companies. In the study, they had a hypothesis that the small and medium sized enterprises (SME) run smaller projects with less project management.

Turner et al. (2010, 746) suggest that the small projects need an even more simplified version of project management than the medium sized. According to Payne and Turner (1999, 56) the emphasis in small- and medium-sized projects should be on the prioritization of the resources in the project portfolio. It was evident in their study that the small projects suffer from the bureaucracy of procedures that are designed for the more complex projects. Turner et al. (2012, 954) discovered that the small companies running smaller projects require more people focused forms of project management. The medium sized companies running medium sized projects use more formal project management, but use still simpler forms of project management than large projects.

The role of the project manager in the small projects is seen as less important. Small sized companies running small projects do not always employ specialist project managers. Thus several project roles might be fulfilled by specialists, including the project manager role. Therefore the small projects are managed by people who have also other primary roles. In medium sized projects more coordination is required and therefore a more formal project management method is usually used. (Turner et al. 2010, 746; 750.)

In small projects the success rate is higher as the scope is narrower and the efficiency for completing the project is higher. The supervision of small projects can be performed by the team leader or the close supervisor as the complexity of the project is low and the amount of stakeholders is limited. (Kozłowski and Matejun 2016, 38 – 40.)

Turner et al. (2012, 955) suggest that for small projects, requirements managements, milestones and work schedule with the resource reservations are the most important parts of project management practicalities. However, they also suggest that procedures that all small and medium sized projects should follow include status reports, risk management and work breakdown structure. Turner et al. (2010 754) discovered that compared with a comprehensive project management method, the small and medium projects are missing cost management, quality management, integration management and stage gates. Also the program and portfolio management was missing as the projects are not seen having critical part in company strategy.

4.2 Large-sized projects

Large projects should be considered to having a link to the business strategy. In studies it has been shown that if the linkage between the business strategy and the project strategy is missing in large projects, it leads up to 30 per cent failure rate. The effective communication, executive support and having the project manager playing part in the business strategy

development as well as having a leadership competent project manager, will tie the project management process to the business strategy . This will raise the probability of success in large projects. (Alsudiri et al. 2013, 597.)



Figure 18 Weak point between business strategy and the project management in large projects (Alsudiri et al. 2013, 597).

Large-sized projects have more complex structure. Therefore the biggest effort is in the coordination between activities and their sequence. The resources must be balanced so that the most critical activities have the resources on timely manner. Also data management in large projects require more management than in smaller sized projects. (Payne and Turner 1999, 56.)

The large project requires a more detailed project scope evaluation than smaller projects as the time used for the project and the complexity is higher. In large projects, the communication is the key element for success. Nowadays in many companies the stakeholders are spread in different organizations and sites, which makes the communication requirements higher. In larger projects, the use of IT tools is raising its importance in the communicational usage. In large projects, the supervision during the project lifecycle is more important than in smaller projects as the complexity of a project is high and the amount of stakeholders might be extensive. Therefore in large projects a project steering group is needed to support the successful implementation of a project. (Kozlowski and Matejun 2016, 39-42.)

4.3 Project scaling models

In the literature a few different ways of scaling projects are presented. According to Turner et al. (2010, 749) the project management method should be selected based on five parameters:

- Size of the project
- Complexity of the project
- Skill of the project team
- Skill of the customer
- Willingness of the customer to pay.

In this chapter, first Project Profile Matrix (Josey and England 2009) and second Goals and Methods Matrix (Turner and Payne 1999) will be presented as the examples of the scaling process.

4.3.1 Project Profile Matrix

The guideline for project management, PMBOK, does not contain a scaling method for a different range of projects. The requirement how a small 50 000 euro project is managed is not the same as the requirement for a companywide project with a budget of 1 000 000 euro. Josey and England (2009) describe in the article how company Progress Energy realized that it was required to have a standardized project management approaching with defined tools and processes including training and qualifications in order to execute projects successfully. The approach was the Project Profile Matrix. In this approach, there are four different ranges: small, medium, large and “mega” projects. (Josey and England 2009.)

In Project Profile Matrix, Figure 19, the projects are classified with two dimensions: The project size and the project complexity. In the project size dimension the project duration, the risk and the total cost are classifying dimensions. (Josey and England 2009).

Project Size			
Mega	>36	>500	>\$500M
Large	36	500	\$500M
Medium	12	150	\$50M
Small	<6	0	<\$5M
	Duration [months]	MW @ Risk	Total Project Cost [\$M]

Figure 19 Elements of Project Size (Josey and England 2009).

The duration of the project is one of the dimensions in the project size. The longer the project, the larger the project is with regard to time involved with the project. The MW@Risk for Progress energy was the risk to disrupting the electric service. It could be also generalized to be the risk to disrupting the key business. The total cost is quite commonly used to define the project size and is also considered in this Project Profile Matrix. (Josey and England 2009.)

Also the Matrix model, Figure 20, requires to classify the project complexity dimension which has three key elements: the degree of difficulty, contracting strategy and stakeholder engagement. The degree of difficulty in Progress Energy was determined by the technology used and the sensitivity to introduce new technology. The contracting strategy in an important feature for complexity in the energy business and the differences in the contracting strategy

should be considered as well. Stakeholder Engagement is a dimension where the amount of stakeholder groups and required communication is considered. (Josey and England 2009).

Project Complexity			
Extreme	First of a Kind Technology / Complicated Retrofits / Highly Disputed Site Locations or Routes	Multiple T&M and Significant Self Perform	Stakeholders can include Board of Directors and External Agencies
High	First of Kind Application / Retrofits / Controversial Site Locations or Routes	Blend of T&M and Firm Price	Stakeholders can include Senior Management and External Agencies
Moderate	Newer Technology With Limited Operating Data / Multiple Tie-ins to Existing Assets / Greenfield Site	Lump Sum / Firm Price	Stakeholders limited to facility or department level personnel only
Low	Proven & Reliable Technology and Application / Existing Site and Minimal Tie-ins to Existing Assets	Turn Key	Minimal number of internal stakeholders
	Degree of Difficulty	Contracting Strategy	Stakeholder Engagement

Figure 20 Elements of Project Complexity (Josey and England 2009).

Project Portfolio Matrix, Figure 21, has defined two dimensions and these two dimensions are then put together. The Matrix defines the minimum level of project management and the procedure compliance. In Project Portfolio Matrix process the project size and complexity are plotted in the Project Initiation phase. The Project Portfolio Matrix uses a color scheme from six sigma concept and projects are classified as being white, green, brown or black. (Josey and England 2009).

Project Size				
Mega	Green III	Brown	Brown	Black
Large	Green II	Green III	Brown	Brown
Medium	Green I	Green II (with blue circle)	Green III	Brown
Small	White	Green I	Green II	Green III
	Low	Moderate	High	Extreme
				Project Complexity

Figure 21 Project Profile Matrix (Josey and England 2009).

Based on Project Portfolio Matrix procedure requirements a needed skill level of the project manager is defined. Progress Energy has taken the matrix so far that it also supports the development of the project managers as it defines the internal trainings that a project manager has to go through in order to move to the next level in the Project Portfolio Matrix. The Project Manager scalability is presented in Figure 22. (Josey and England 2009.)

White	Associate Project Manager	<div style="display: flex; gap: 5px;"> <div style="width: 15px; height: 15px; background-color: white; border: 1px solid black;"></div> <div style="width: 15px; height: 15px; background-color: green; border: 1px solid black;"></div> </div> <ul style="list-style-type: none"> - Comply with procedures less Attachment A - Partial suite of templates - Minimal training required of tools
Green	Project Manager I, II, III	
Brown	Senior Project Manager	<div style="display: flex; gap: 5px;"> <div style="width: 15px; height: 15px; background-color: brown; border: 1px solid black;"></div> <div style="width: 15px; height: 15px; background-color: black; border: 1px solid black;"></div> </div> <ul style="list-style-type: none"> - Comply with entire procedures - Full suite of templates - Requires specialized training of tools
Black	Major Project Manager	

Figure 22 Project Manager scalability (Josey and England 2009).

4.3.2 Goals and Methods Matrix

Payne and Turner (1999, 56 – 58) describe in their study an approach called Goals and Methods Matrix which is presented Figure 23. Originally, the method was introduced in an article by Turner and Cochrane in 1993. Their model is built on different types of projects that require a different approach regarding planning and control.

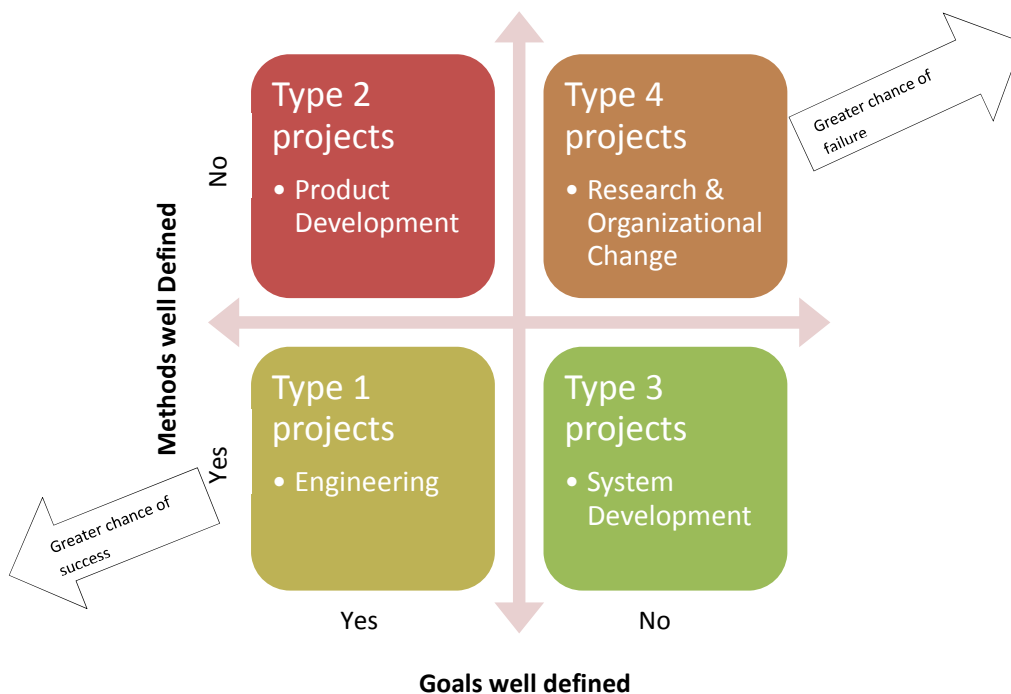


Figure 23 Goals and Methods Matrix (Payne and Turner 1999, 57).

The type 1 and 2 projects have well defined goals. Type 1 projects are projects that are using the traditional project management approaches. In these projects, the goals and methods how those goals can be achieved are well defined. The planning is more activity based and the steps in the project procedures are clear. The type 2 projects are typically product development

projects. The goals are well-known but clarifying the method how to reach the goal is the most important thing in the project. The Product breakdown structure (PBS) is used to define the sub-goals and milestones achieving the goals represent the components of the end-product. (Payne and Turner 1999, 57.)

The type 3 and 4 projects do not have goals well defined at the start of the project. The type 3 projects are usually system development projects. The goals are not usually well-defined and the planning is based on the project lifecycle. Payne and Turner (1999, 57) define that for example PRINCE2-methodology is in general used for these kind of projects. Type 4 projects are usually managed as type 2 or type 3 depending on the project structure. (Payne and Turner 1999, 57.)

Based on the Matrix Payne and Turner (1999, 57) suggest that the projects of different size and types must have tailored procedures in order to meet the needs of the project type. They state that there are still benefits from having a common approach to project management. Payne and Turner propose that in order to answer this, a standardized but adoptable project management a strategic plan is needed.

Payne and Turner (1999, 57 – 58) define three levels of planning:

1. Integrative level. For all projects, a Project Charter should be developed. This document will ensure that all projects have the same level of details for comparison and prioritization in the portfolio.
2. Strategic level. Project responsibility chart and a milestone plan are required. However, the milestones are depending on the project type so that the milestones for types 1 and 2 are the components of the product in development and for type 3 and 4, the lifecycle stages. The resource plan should then be developed for the milestone level. For smaller projects only one resource plan is required but for larger projects it might be required to split the projects into smaller sub-projects with their own milestone and resource plan.
3. Tactical level. Project planning methods are selected based on the project's size and nature. For smaller projects, the required details of planning are already achieved whereas large projects require more detailed plan to support the project execution. The more detailed planning is done based on the project type. In those projects where the details of the project are known early a more detailed plan is made already at the beginning. In projects where exists more uncertainty a rolling wave planning is used.

5 CURRENT STATE ANALYSIS

5.1 Qualitative research

The qualitative research aims to gain understanding about the research subject by describing and interpreting it. The target is to interpret the real world by studying thoroughly the selected observation targets but the findings cannot be generalized as the received results are valid only for the people interviewed. The researcher is interpreting the outcome of individual observations from the real world as research results. (Kananen 2014, 16-19.)

Quantitative methodology is usually a formal questionnaire where a large number of respondents are asked the same questions. Typical quantitative methodology is theme or group interviews. (Ojansalo et al. 2015, 104 – 105.) It is seen that quantitative and qualitative methodologies are supplementing each other and can be used also in the same research (Hirsjärvi et al. 2007, 132 -133).

5.2 Data collection

In this study, the data for the analysis was collected with theme interviews. The theme interview is a discussion where the researcher tries to understand and gain information about the interest of objects. The researcher is setting the conditions for the discussion and initiating the interview. (Aaltola and Valli 2010,26.)

The theme interview can also be described as a semi-structured data collection method. In a semi-structured interview, the researcher knows that the selected people have experience on the topic in question. The researcher will familiarize herself with the entity and processes of the research problem. Based on the analysis, the frame and assumptions are created for the interview. In the interview, the subjective experiences are discussed with the observation targets. (Hirsjärvi and Hurme 2008, 47.) In semi-structured interview the order of the questions can be changed based on the progress of the discussion. In case required, some questions that have been prepared in advance can be left out and more detailed questions can be presented instead. (Ojansalo et al. 2015, 108.)

For the thesis ten interviews were held. One person gave answers by e-mail due to time restrictions. Six of the people that were interviewed were from PS-IT team and had at some point of their working history had the role of project manager. One PS-IT business partner was interviewed. Three people were interviewed from Supply Center Turku, two full-time project managers and one PMO manager. The setup is presented in Figure 24 Thesis interviews.

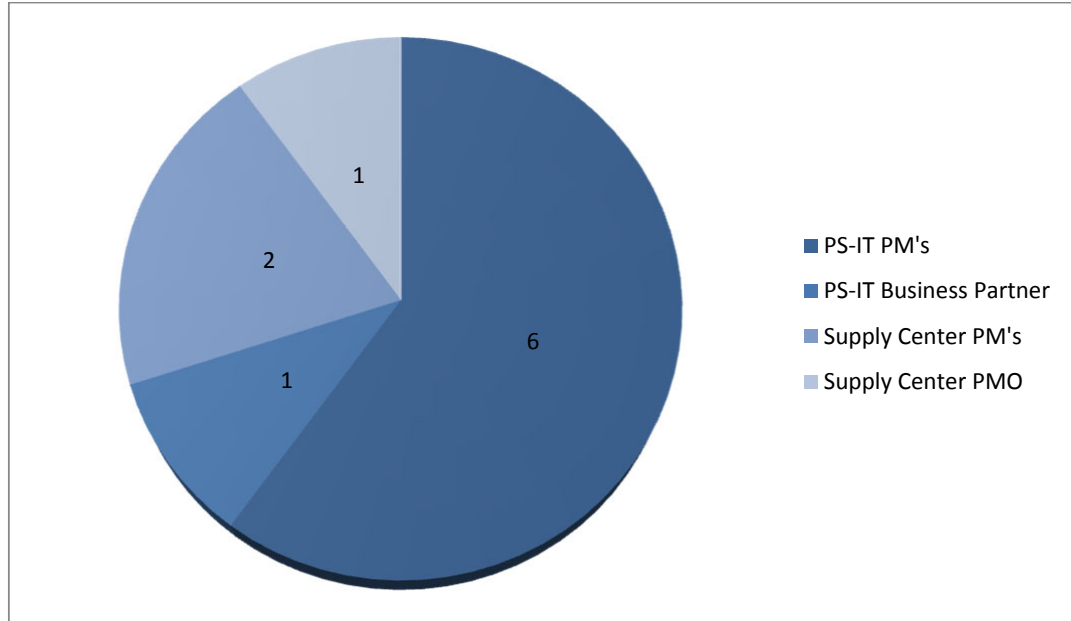


Figure 24 Thesis interviews

All the interviews had the following questions asked but the discussion had the chance to go deeper if required.

- Portfolio management
 - How do you see the project portfolio management at PS-IT?
 - How would you enhance it?
- Project management in general
 - What are the critical things to success of a project?
 - How is a large project defined?
 - How is a small project defined?
 - How is GMP infecting the project definition?
 - When do you consider a project to be successful?
 - What parts of project management do all projects need despite of their size?
- Project management at PS-IT/Turku Supply Center
 - How would you define a project?
 - How are projects started at PS-IT/Turku Supply Center?
 - How do you see the project management at PS-IT?
 - Do you know what you are expected of as a project manager?

The interviews were held in person in August 2018. All interviews were held in Finnish and recorded. The length of interviews varied from 30 minutes to 60 minutes. After the interview, the recording was transcribed in order to analyze the data more easily and find the possible patterns in the answers.

5.1 Current state

Product Supply IT is a supporting function to Supply Center Turku. The supporting function has a role as a key player in the success of project management in Supply Center projects. However, PS-IT can also identify projects that can be seen as strategical for the future success of Bayer Turku.

The PS-IT portfolio management is concentrating on the so called Business Partner –role. A business partner is the contact point for business requirements that have an IT connection. The business partner to Supply Center Turku is the contact point for business if a project requires IT resources or input. When a business partner is contacted with a requirement, it is the business partner’s task to analyze the requirement further and then take it to a business partner meeting for approval. In this phase, a very rough estimate for the workload and budget exists but the estimation is not based on deeper analysis or project planning.

If a requirement is approved in the business partner meeting, a project manager from IT is nominated. In PS-IT, the project manager is not, in most cases, the project manager for the actual Supply Center project but should coordinate the IT related tasks and requirements and is the main contact for the project manager.

The requirement for a project might also be initialized by IT without business linkage. The process for initializing the project is however the same regardless of the source of the requirement.

5.2 Data Analysis

In this chapter, the key findings from the interviews are summarized. The texts with intend are direct quotations from the interviews, and then translated into English.

5.2.1 Portfolio management

The role of the portfolio management office is to ensure that the projects in the portfolio are selected so that it supports the strategy. The so called scanning and selection phase was seen as beneficial to select the projects for the project portfolio that have a strategical alignment and to find out what projects are feasible to start regarding time, money and resources. The strategic alignment was not understood in all of the cases. It was however stated that the requirements for the project prioritization based on the strategic requirement were understood by the project resources but the communication of the prioritization was seen as lacking in some cases.

The interviews were started with questions regarding portfolio management in PS-IT and in Bayer Supply Center. All the people interviewed understood the process in general but in

multiple interviews it was also mentioned that the process has lack of transparency to project resources. It was also mentioned that not all the projects that are running in PS-IT are coming through the defined Business Partner process (explained in chapter 5.1 Current state).

In the interviews, people mentioned that there are too many projects running parallel and the phases from project initiation to project execution are not clearly defined. This is valid for projects running in Supply Center and in PS-IT. The problem of having multiple projects running parallel with the same resources was seen as the main reason for problems in the project through-put time. The project resources in many cases did the prioritization based on their own feeling of the urgency.

Päästäis parempaan lopputulokseen, jos määrä olisi pienempi. Jos on iso tankki, niin tipan kestää kauan mennä sen läpi. Jos se tankki olisi pienempi, niin se kestäisi vähemmän aikaa. (We would achieve better results if the amount would be smaller. If the tank is big, it takes a long time for a drop to flow through. If the tank would be smaller, it would take less time.) – PS-IT team member

The projects are started in some cases directly from the project execution phase without project planning. The need to have project follow-ups was mentioned a few times. It was seen very important to have a regular follow-up by the Business Partner or some other named project portfolio responsible in order to be able to understand where projects are currently running, and in case of problems, a required focus would be put to the projects in question. The feasibility of projects should be analyzed at more detailed level, based on the interviews.

Resourcing is seen as a big issue in PS-IT and Turku Supply Center. As the project resources are working also on operational tasks, the usable amount of hours to project work varies. This makes the project planning even more challenging. There is no proper project resource planning across the Bayer Turku as the Supply Center project resourcing is done in tool called "Thinking Portfolio" and PS-IT is using the Nordic IT level tool "Camako". The resource requirements from Supply Center projects are not always clear and the resource requirements are not updated if the project plan and schedule has changed.

In the interviews with the Supply Center project managers and the PMO manager, the requirement for a common framework was identified. Even though PS-IT and Supply Center are nowadays working closer together, a more standardized way of working would be seen as beneficial. The Project management office with representatives from different organization units was mentioned as one option to improve the co-operation and management of projects.

5.2.2 Project Management in general

The definition of large and small projects was discussed in all of the interviews. All agreed that there are multiple characteristics that specify the projects to be small or large. The characteristics that were mentioned in the interviews were:

- Work amount

- Amount of stakeholders
- Required different specialists
- Budget
- Timeline
- Business influence
- Business risk
- New technologies

When discussing the critical elements for the project management, the answers were unanimous: the clarity of the scope for the whole project team as well as the confirmed availability of the resources. Both of these require a good project plan that has the breakdowns in the suitable level depending on the project requirements.

GMP was not seen as a characteristic that would affect the project management process. In the medical industry GMP is taken as a given feature and that has to be in all work what is done.

GMP kulkee aina mukana. Onko meillä muita kuin GMP-projekteja, jos me tehdään projekteja tuotantoon? (GMP is always there. Do we have other than GMP-projects if we do projects to production environment?) – Bayer Supply Center Project Manager

Even though GMP adds some documentation requirements that are seen as normal everyday work. In some cases GMP is seen as an element that structures the work as the change management requires some breakdowns to be created as well as risk assessments.

The requirement to have a standardized framework for projects arise from all interviews. All agreed that it is feasible to have a common structure how projects are managed and the deliverables required in each project phase defined. However, the selected framework should be flexible and support the work and not to make it too bureaucratic. The wording “Minimum viable bureaucracy” was used to specify the framework in one of the interviews.

Success of a project was in many interviews seen as two dimensional. The project success was related to the deliverables. If a project is able to deliver the required results in the specified budget and time, it can be considered as successful. However, some of the interviewed people mentioned that a project might be successful from the project management perspective even though the project is not finalized. When project manager is for example able to identify risks in the project planning phase and when those risks activate and the project is ended due to that, a project might be seen as successful despite this.

The way of working in projects was mentioned in a few interviews. The project management process and the way of working in Bayer projects were seen as an important orientation requirement for all people that will at some point of their work life work as a project resource. If project resources would have a common understanding in what is expected of them when working as a project resource that might improve the quality of the projects in long run.

An interesting idea was presented in one of the interviews where the project manager training and skill development was structured in the project management process. For all people starting as a project manager, a company specific project management training would be offered. As soon as they start to manage their first project, a tutor project manager would help and guide the project manager through the first project. This would ensure that the project management culture is transferred from the experienced project managers to the beginner project managers.

5.2.3 Project Management at PS-IT

The interviewed people in PS-IT were all aware of the definition of a project. However the start of the project was not clear to everyone as a different name of the project initiation and project planning phase are used. In some cases, this phase is called “pre-projects” and some projects are missing this phase and started from the execution directly.

Meidän projektit tällä hetkellä otsikkotasolla, meiltä puuttuu taskit ja vaiheet. Osittamista pitäisi tehdä enemmän, jolloin pystyttäisiin sanomaan että tämä tekee tässä ja tämä tässä ja mikä on kriittinen polku. (Our projects are currently only on topic level, we are missing tasks and phases. We should do more breakdowns, and then we could say that this is done by this person and this by this, and what is the critical path.) – Bayer PS-IT team member

A few people mentioned that the lack of standardization is the reason why the project management is not that successful currently in PS-IT. Depending on a project manager the selected methods and framework are selected and it might even vary even though the project manager is the same. However, it was stated that in smaller projects, that might be even considered to be tasks that are run as a project, the standardization was not seen as a requirement. Based on the feedback that could even slower the progress of the project.

5.3 SWOT analysis

The current state of the PS-IT portfolio and project and portfolio management based on the data gathered during the interviews is analyzed with SWOT analysis in Figure 25. The themes in the SWOT analysis were also mentioned in the research interviews. The conclusions are summarizing the themes that were discovered from the data analysis.

Internal Factors	
Strengths	Weaknesses
<ul style="list-style-type: none"> + PS-IT has multitalented people + Process of initializing projects is fast + Projects selected have a strong strategy alignment + Prioritization is done based on strategical importance 	<ul style="list-style-type: none"> - Projects are started with limited information - Planning is very limited - Multiple projects are run at the same time - No structured follow-up of project progress is defined - Same resources are working in multiple projects - In IT the so called project manager is in most cases the best specialist
External Factors	
Opportunities	Threats
<ul style="list-style-type: none"> + The requirement for better project management has been understood in IT and in Supply Center + The portfolio and project management enhancement is running on Supply Center simultaneously + The standardization of project management is done as a joint effort 	<ul style="list-style-type: none"> - The tools used differ in Bayer Nordic SE and Bayer Oy - In order to manage resources on Supply Center projects there is a risk that PS-IT might need to manage resources in multiple systems
Conclusions	
<ul style="list-style-type: none"> - Portfolio Management Office is seen as beneficial - The PS-IT project process cannot be changed without linkage to Supply Center Project management process → Projects cannot be done in silos - Project feasibility should be studied before projects are started → Must be also possible to say “no” the project - More detailed and transparent project prioritization is needed → the strategy linkage - More detailed process and follow-up for projects is needed → deliverables clear in all stages - Standardization should support different types and sizes of projects → Minimum viable bureaucracy as an idea - Tools should be selected as common effort with Supply Center Turku → dual maintenance should not be allowed 	

Figure 25 SWOT analysis for current state

6 DEVELOPMENT PLAN

Turku Supply Center and PS-IT are in the dawn of a new project and portfolio management process. Despite the fact that PS-IT and business are divided into separate corporates, the requirement for having a common project and portfolio management framework is clear. During the execution of the thesis, the need to create a new project framework and develop project management practicalities at Bayer Product Supply arises. There was a project started that aims to create a new Project Handbook for Bayer Turku. The framework created for this thesis will be applied as a framework for Bayer Product Supply. Due to the project timeline, the methods and processes presented in this thesis are a snapshot of a situation from the project, which may still be further developed during the year 2018.

In this chapter, the proposal for the project portfolio and project management process is described. Also a snapshot of the project management scalability framework is presented later in this chapter.

6.1 Project Portfolio Process

The Project Management Office is responsible for the project portfolio management. The project Management office is required when multiple projects there are running simultaneously and alignment between different projects are needed. Currently in IT the Project Management Office is newly started and focus has been put to analyze the project ideas further and gain a deeper understanding about the requirements.

There are multiple ideas for projects identified in IT and in the business. In the IT project portfolio management it is essential that the IT Project Portfolio is selected with the consideration of the satisfaction of the business stakeholders. This means that if IT recognizes a requirement for a project that has a strong IT background, the requirement has to be sold to the business. If business understands that the idea that IT is presenting has an impact on the business and has a strategic alignment, the project idea can be also managed in business Project Portfolio. The key element is for business to understand that IT projects support the business initiatives and are not pure IT initiatives in most cases.

Figure 26 represents the alignment of IT Project Portfolio and Business Project Portfolio with the strategic connection. The IT Strategy is aligned and prioritized with Business strategy and the Project portfolio is influenced by this review process that should be done continuously. At Bayer, this approach will be further developed as the both IT and business see that as a benefit.

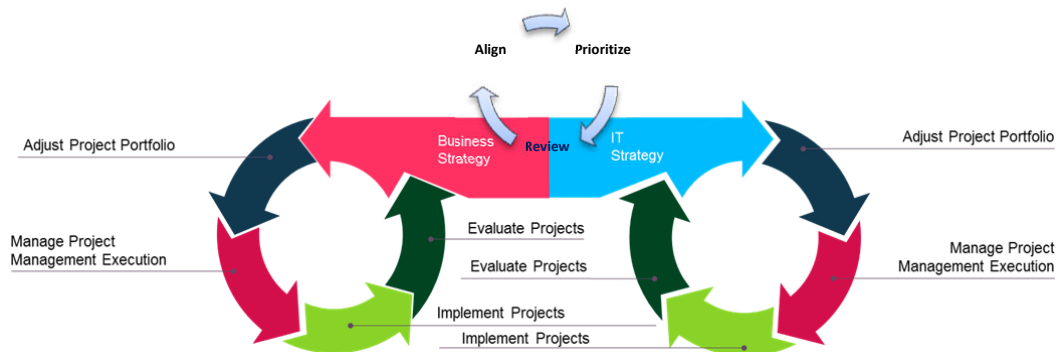


Figure 26 Business and IT Project Portfolio management process

The issue is quite often that many projects are running parallel and a lot of project ideas are identified. Currently there is no detailed planning behind the projects to ensure the success of the projects. The prioritization of the projects that are selected for planning should be done in co-operation with business. The prioritization should have at least following relevancies considered

1. Strategy relevancy
2. GMP/legal/security relevancy
3. Corporate requirement relevancy

However, the prioritization of the projects in the portfolio has not been considered in detail when data for the thesis has been developed and therefore the project prioritization within a project portfolio is not in scope. This prioritization should be considered as future development activities in co-operation between business and IT.

6.2 Project management process

Drawing a line, where the project management process starts and the project portfolio management process ends is sometimes a challenge. PMO is required to support the process for the whole project lifecycle and therefore the role of project portfolio management remains in the background. In this chapter the standard project management approach at Bayer is presented until the project execution phase as stated in the scope of the thesis.

Even though the agile project management has been a popular development path for IT projects in the previous years, there are several reasons at Bayer to remain with the traditional waterfall method. Even though Rasnacs and Berzisa (2015, 18) suggest that the strict PM processes are the reason why projects fail, the GMP area creates a requirement for project management to be standardized. However, it does not mean that the project management methods should be inflexible! Bayer wants to build a scalable, more flexible and agile project

management method but create a framework that ensures that all projects are run with the same methods and the transparency of project management can be ensured. If people know how projects are run and do not have to adapt their way of working from project to another, project team members can concentrate on accomplishing the goal of the project. Standardized but flexible project management methods give projects managers also the possibility to think about the emotional and social factors of project management.

The lean culture can be implemented into project management at Bayer quite easily. As the change of Portfolio management process suggests, the project team members will have fewer projects to work with. This increases the efficiency of a project team by increasing the flow. This will also increase the communication level of the project team, which then improves the project results through constant feedback. (Jalali et al. 2016, 256.)

The project flow at Bayer PS-IT and Bayer Supply Center has been agreed to follow the same process. The process is the basic waterfall flow based on the ISO21500 and PMBOK processes. This method was selected as it gives the possibility to have a flexible approach to project management methods. The process flow with the gates is presented in Figure 27 Project lifecycle and gates at Bayer.



Figure 27 Project lifecycle and gates at Bayer

In chapter 6.3 the project scaling matrix for Bayer is introduced to support project management decisions. In chapter 6.4 Project management, a framework table, will be presented that will support project managers to lead their projects successfully with a minimal set of bureaucracy based on the scaling that is defined at the beginning of a project. The table includes also the executing phase even though not in scope of this thesis.

6.3 Project Scaling

The requirement to scale the project management efforts was evident also based on the data gathered in the interviews. The scaling of projects is a method based on which many project managerial methods required to successfully manage the project can be selected. The scaling however is not a one-dimensional factor. For Bayer two matrixes are built to support the scaling of the projects. In this chapter first two scaling dimensions will be described and then a project scale matrix is introduced.

Based on the literature and the interviews it was obvious that definition of large or small projects is not one-dimensional and cannot be done with only one characteristic. Therefore

two tables were built. One table to think about the size of the project and the characteristics that define it, and one table to define the project complexity factors.

The characteristics that define the size were selected to be duration, resources and project cost are presented in Figure 28 Matrix of Project Size. These three come from the basic project triangle. The selected content for each can be fine-tuned after the approach is taken into use, but the definition describes the current understanding of each level.

Large	>12 months	>10 resources	> 500 000
Medium	6-12 months	6-10 resources	50 000-500 000
Small	< 6 months	≤ 5 resources	< 50 000
Project Size	Duration	Resources	Project Cost (excl. Internal resources)

Figure 28 Matrix of Project Size

Project complexity was considered based on the literature and interviews as well. The selected characteristics are presented in Figure 29 Matrix of Complexity, As Bayer is running multiple projects at the same time one critical factor for project complexity was the dependency to other projects. The number of stakeholders makes the project more complex as well. In case of more stakeholders are involved, the project team and the requirement for communication rises. The last characteristic in the project complexity is the degree of difficulty. The difficulty arises if there are new processes or new technologies to be introduced.

High	Project is highly dependent on other projects	>5 stakeholders	Totally new technology/process to Bayer, innovation
Moderate	Project has low dependency on other projects	3-5 stakeholders	Project is introducing some new technologies/process or new usage of current technology/process
Low	Project is not dependent on other projects	≤ 2 stakeholders	Technology/process is Bayer standard or otherwise well-known
Project Complexity	Dependency to other projects	Stakeholder Engagement	Degree of Difficulty

Figure 29 Matrix of Complexity

When a project is approved, which in this case means that a project moves to phase Initiating, the size and the complexity of the project will be analyzed by the project owner with the help of a project manager and a possible project team. Based on these two dimensions, the project is placed on the Bayer Project Scale Matrix presented in Figure 30.

Size			
Large	M	L	L
Medium	S	M	L
Small	S	M	M
	Low	Moderate	High
	Complexity		

Figure 30 Bayer Project Scale Matrix

The project management methods and deliverables that are based on the matrix are described in chapter 6.4 in detail.

6.4 Project management framework

In this chapter, the project management framework for Bayer is presented. First the project deliverables based on the scaling will be presented in a table and after that each of the project phases will be described in more detail. As described earlier, it was agreed that Bayer Turku will use the standard waterfall method that is based on the ISO21500 and PMBOK approaches that offer a possibility to adapt the methods for the organizational needs that are specific for Bayer. The portfolio and project management process flow with specific gates are presented in Figure 27 Project lifecycle and gates at Bayer.

The starting point for creating the scalable framework was to specify the so called normal project, in Bayer Project Scale Matrix the project category M. Payne and Turner (1999, 56 – 57) discovered in their study that the size of the project and the used procedure correlated with the success of the project. They found out that with medium sized projects there was no difference in success whether a standardized process was used which led them to make assumption that the standardized processes are designed considering medium sized projects. This is the most common project category at Bayer and therefore a good starting point. It is obvious based on the interviews that even though the bureaucracy is planned to be the minimum, it will seem as a lot for project managers that are not used to have a standardized framework and methods. The deliverables and identified tasks are presented in Table 1. The table also defines the responsibilities for the identified task or deliverable.

In the table three new Bayer specific terms are presented. The **PSG meeting**, Project Steering Group, is a monthly meeting to follow up the project's progress, mainly focusing on the schedule, cost and resources. Any topic which will have a possible impact on the scope, schedule or budget of the project, is raised to Level 4 meeting agenda. PSG is led by the Owner and other participants are PMO, Site Controller and Project Manager. PSG is authorized for approving the new phase of an existing project (phases P1 and P3). The **Level 4 meeting** is a monthly meeting to ensure successful and balanced Supply Center Turku (SC Turku) strategy implementation and to prioritize TOP 15 SC Turku projects. Level 4 is responsible for approving or rejecting a new project, the new phase of an existing project (phases P0, P2 and P4) or any major changes regarding the approved project plan. Level 4 participants are the members of the SC Turku Leadership team.

Symbol	Description
●	Mandatory
○	Optional
◐	Rough

Phase	Description	Definition	S	M	L	Source	Deliverable	Responsible	Accountable	Contribute	Informed
Scanning and Selecting	Need or idea selection driven by strategic goals and aligned with the yearly budgeting process. Deciding whether to continue or stop the idea and whether the development is done as a project or a line activity. Nominating project owner.	Create Selection One-Pager	●	●	●	ProjectTori	Selection One-pager	Need Owner	PMO	SME	Impacted function leads
		Define high level scope	●	○	○	ProjectTori					
		Define business reason (qualitative and quantitative benefits)	●	●	●	ProjectTori					
		Define strategic alignment	●	●	●	ProjectTori					
		Define rough business case	◐	○	○	ProjectTori					
		Identify costs on high level	◐	○	○	ProjectTori (Straco, etc)					
		Define preliminary project resources on a pool level	●	●	●	Missing					
		Create initial schedule target	◐	○	○	ProjectTori (Straco)					
Create high level impact analysis	◐	○	○	ProjectTori							
Identify risks on a high level	◐	○	○	ProjectTori							
Gate PS: Need Go / NoGo Approval											
Initiating	Processing the Need in order to obtain approval for project initiation. Preparing a project charter, including vision and the scope statement, initial budget and resource needs, and business case. Project charter is a project order and considered as a handbook document from ordering unit to delivery unit.	Create Project Charter	●	●	●	ProjectTori	Project charter	Project Owner	PMO	Project Manager, Line Manager, Stakeholder, Controller, SME	
		Identify stakeholders initially	●	●	●	ProjectTori					
		Define project scope and business goals	●	●	●	ProjectTori					
		Define project targets and success criteria	●	●	●	ProjectTori					
		Define resources for planning and identify for executing	●	●	●	ProjectTori					
		Nominate a project manager	○	○	○	ProjectTori					
		Define high level schedule	●	●	●	ProjectTori					
		Validate and maintain high level risks (prioritize project triangle)	●	●	●	ProjectTori					
		Define possible assumptions and constraints	●	●	●	ProjectTori					
		Define business cases for project justification	●	●	●	ProjectTori + template					
Define need for steering group	●	●	●	ProjectTori							
Scale the project	●	●	●	ProjectTori + template							
Gate P0: Project Start Approval											
Planning	Kick off the project and establish a project team. Depending on project, a feasibility study and a solution concept is created before the project is able to proceed with the project plan creation.	Create Feasibility study	●	●	●	Template	Feasibility study	Project Manager	Project Owner	Project team, SME	Impacted function leads
		Establish steering group	●	●	●	ProjectTori					
		Organize a project kick-off	●	●	●	PM Handbook					
		Define business problems and opportunities	○	○	○	ProjectTori					
		Define business requirements	○	○	○	Template?					
		Define possible solutions	○	○	○	Template?					
		Score the solutions and decide implementation option	○	○	○	Template?					
		Specify preliminary requirements	○	○	○	URS					
Gate P1: Project Concept Readiness (Optional)											
Planning	Create a Project Plan that responds to the business need. Project plan includes finalized and detailed description of project scope and work breakdown, schedule, cost and resource needs. It covers also other critical project success factors such as stakeholder analysis and plans for communication, change management, quality management, training and risk management.	Create Project Plan	●	●	●	ProjectTori	Stakeholder analysis and communication plan	Project Manager	Project Owner	Project team	Line Managers, Impacted Function Leads, SMEs
		Verify and finalize project scope	●	●	●	ProjectTori					
		Finalize stakeholder mapping	●	●	●	ProjectTori					
		Define stakeholders expectations and power of influence	●	●	●	ProjectTori					
		Define stakeholder communication plan	◐	○	○	ProjectTori					
		Define project goals based on business goals	●	●	●	ProjectTori					
		Define deliverables, defined in scope, out-scope	●	●	●	ProjectTori					
		Define resources for execution (project team and SMEs)	●	●	●	ProjectTori					
		Assign roles and responsibilities to the project team	●	●	●	ProjectTori					
		Create work breakdown structures, with deliverables	◐	○	○	Template?					
		Create tasks	◐	○	○	Template?					
		Define detailed schedule plan	●	●	●	Template?					
		Define project management change process	●	●	●	ProjectTori					
		Define project management quality plan	○	○	○	ProjectTori					
		Define documentation practices	◐	○	○	PM Handbook					
Create training plan	○	○	○	ProjectTori + template							
Create risk management plan	○	○	○	ProjectTori							
Define business cases for cost controlling	◐	○	○	Missing							
Specify final requirements	●	●	●	URS							
Gate P2: Project Plan Approval											
Executing	Executing the project deliverables according to the project plan. The phase includes monitoring and controlling of the execution. Ready for Go-live milestone is determined when the project deliverables are available for the production use for the first time. Executing phases closes when production-critical files are done and non-critical fix plan is created.	Follow up schedule	●	●	●	ProjectTori + ?	ProjectTori update	Project Manager	Project Owner	Project team	PMO, Line Managers, Impacted Function Leads
		Follow up and execute tasks	●	●	●	ProjectTori + ?	Project plan				
		Follow up costs	●	●	●	ProjectTori + ?	ProjectTori update				
		Follow up resourcing	●	●	●	ProjectTori + ?	ProjectTori update				
		Create regular status reports	●	●	●	ProjectTori + other	Status report				
		Organize Regular status-meetings	●	●	●	ProjectTori	Meeting minutes				
		Organize Regular steering group meetings	●	●	●	ProjectTori	Meeting minutes				
		Contribute to Monthly PSG meetings	●	●	●	ProjectTori	ProjectTori status update				
		Follow up communication plan	●	●	●	ProjectTori	Communication register				
		Control risks and maintain risk management plan	●	●	●	ProjectTori	Risk analysis				
		Train users	○	○	○	PM Learning	User guide, SOP, End user tra				
		Milestone: Go-Live Readiness									
Executing	Monitor and follow up the deliverables in production during agreed time period (Hypercare) and fix the critical issues.	Hypercare: Monitor the deliverables in production and act	●	●	●	ProjectTori		Project Manager	Project Owner	Project team	PMO, Line Managers, Impacted Function Leads
		Fix critical issues during the Hypercare period	●	●	●	ProjectTori					
		Create a fix plan for non-production critical issues	●	●	●	ProjectTori final report					
		Handover to customer	●	●	●	ProjectTori					
Gate P3: Deliverables complete Approval											
Closing	Closing the project after a successful Hyper care (follow up) period. It includes summarizing the project history to a final report.	Create Project Final report	●	●	●	ProjectTori	Project final report	Project Manager	Project Owner	Project team	PMO, Line Managers, Impacted Function Leads
		Document lessons learned	●	●	●	Template					
		Conduct stakeholder satisfaction survey	●	●	●	Template					
		Release project resources	●	●	●	ProjectTori + Final Rep					
Gate P4: Project Closing Approval											
Post Evaluating	Conducting a post evaluation of the targeted business benefits from the initial Need setting.	Compare realized business case to project justification business cas	●	●	●	Missing	Project final Report	Project Owner	Level4 meeting	Project manager	Project team
		Compare original business benefits to realized business benefits, and learn for future projects and archive project	●	●	●	Missing					
			●	●	●	ProjectTori					
Gate PE: Post Evaluating Approval											

Table 1 Bayer project deliverable list

Category S projects are defined in the Table 1 as well. The difference between the category M and S is the details. For example in the initiating phase the category S does not require to have a detailed stakeholder analysis with impact and interest analysis and well-planned communication plan. Instead it is required to identify stakeholders in category S project as well and have a rough plan for the communication. There is no need to create separate detailed feasibility analysis, instead that can be done on high level and attached as a part of project plan. In the planning phase, there are a few differences as well. The category S projects do not require a separate project specific steering group. For the S projects the PSG meeting is enough from the steering point of view. In the S projects the level of planning can be more high-level. The detailed task planning is not required in many of the cases and the level can be

agreed within the project team. Project executing is mainly about following the tasks and in category S also status reporting is required but there is no separate communication register that should be followed.

The category L projects are usually the biggest and most expensive investment projects and followed in detail in most of the cases from the global project management and portfolio point of view. For these large projects, Bayer has global frameworks established. For IT, the framework is called FramelT and for investment projects PES (Project execution System). These already established frameworks will not be presented in this thesis and Bayer Turku will follow these approaches when category L projects are in question, if applicable. If category L projects do not follow the Bayer global standard project methods, then the category M project management method can be applied if seen as beneficial.

Scanning and Selection

When an idea or a need of a project is identified, in business or in IT, there is a need to investigate it further. This phase at Bayer is called PS, Pre-portfolio Scanning and Selection. In this phase, the Owner of the Need is the key. The owner is responsible for gathering the information specified in Table 1. The deliverable for the need is a Need One-Pager which is shown in Figure 31 Example of Selection One-pager. When a Need has everything specified, it will enter the Gate PS. In the Site Leadership meeting the needs are presented and the end result is to have a Go/NoGo decision.



Project Name

Link to Strategy: Add

REASONING	What is the reason for this project? Add	ORGANISATION	Project organization: Project champion: <u>n.n.</u> Project manager: <u>n.n.</u> Project team: <u>n.n.</u>																												
SCOPE	What are the goals and deliverables of this project? Add	RISKS	Major risks: 1) Add Dependencies: 1) Add																												
BUSINESS CASE	Business benefits Add Resource needs (people): Add Costs / Investments: Add Business impact: Add	SCHEDULE	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #4CAF50; color: white;"> <th>No</th> <th>Measure/ Mid-goal</th> <th>Responsible (Name)</th> <th>Schedule (Gate Date)</th> </tr> </thead> <tbody> <tr><td>P0</td><td>Project Initiation</td><td></td><td></td></tr> <tr><td>P1</td><td>Project Concept Approval</td><td></td><td></td></tr> <tr><td>P2</td><td>Project Plan Approval</td><td></td><td></td></tr> <tr><td>P3</td><td>Project Goals Achieved</td><td></td><td></td></tr> <tr><td>P4</td><td>Project Closing</td><td></td><td></td></tr> <tr><td>PE</td><td>Project Value Realization</td><td></td><td></td></tr> </tbody> </table>	No	Measure/ Mid-goal	Responsible (Name)	Schedule (Gate Date)	P0	Project Initiation			P1	Project Concept Approval			P2	Project Plan Approval			P3	Project Goals Achieved			P4	Project Closing			PE	Project Value Realization		
No	Measure/ Mid-goal	Responsible (Name)	Schedule (Gate Date)																												
P0	Project Initiation																														
P1	Project Concept Approval																														
P2	Project Plan Approval																														
P3	Project Goals Achieved																														
P4	Project Closing																														
PE	Project Value Realization																														

Figure 31 Example of Selection One-pager

The system used for portfolio and project management will be developed to support this process still during 2018, but until the system is enhanced the project ideas will be presented with a simple slide.

Initiating

After the approval to move to Initiating phase, the more detailed project work starts. At Initiating phase, the Owner is still responsible for creating the deliverables defined for the phase. Table 1 describes the tasks for the Initiating phase. The main deliverable is the project charter which specifies the project in detail. The requirement from the interviews was that the bureaucracy of project management is set at minimum level. However, it is recognized that for a project certain activities are always needed.

In the initiating phase, the project scaling is performed. It is possible to use the Bayer Project Scaling Matrix to specify also the Project Manager skill-level. For category M projects it might be required that the project manager is more experienced. If the Owner has a Project Manager available, it is possible for the project manager to support the Owner at the Initiating phase.

At the Initiating phase, the Owner will check if the required resources for the Planning phase exist. At this phase it is not mandatory to check whether the project itself would have resources available, the detailed resource planning will be done if the project will request the Project Plan approval and enter the project execution phase. An important task for a project owner is to specify if the project would require a separate project steering group.

When the Project Charter is ready and has all the information required, the Owner will present the project in the next gate meeting. The name of the approval meeting depends on if it is IT internal or business approval meeting but the content of the meeting is the same: to agree whether the project can be approved to Planning phase to further analyze the project feasibility and create the requirements. If a project is not approved to Planning phase, the project will either be put to a waiting list or cancelled.

Planning

When a project is approved to the planning phase, the project responsibility is switched over to project manager which is nominated at the beginning of the planning phase if not specified earlier. To reach the goals of lean, it is essential at the beginning of a project for a project manager to involve project team early on to plan the project. After the project team is established, a project kick-off meeting is organized. Working together increases the awareness of the scope of the project but also awareness of what other project team members are doing. With this, the communication within the project team increases and it correlates into better project results. This early involvement also adds the commitment to the project results. (Jalali et al. 2016, 257.)

The planning phase is divided into two gates. At the beginning, the project team will create a feasibility study. This study can be on a high level for the project category S but for category M it might be extremely important to consider the solution possibilities in detail. Project team also creates the User Requirement Specification to understand in detail what is required to be

the outcome of the project. When feasibility study and URS are ready, the project will enter the Concept approval gate.

After the approval of the concept, the project plan work is started. The first thing to do is to identify the stakeholders. For category M projects the Stakeholder analysis is done at more detailed level to understand the expectations and the power of influence of the stakeholders. Based on this, the project manager will create a communication plan with the project team.

The most important document for the project manager to create with project team is the project plan. Depending on the category specified for the project the details in the project plan are defined. This approach is also flexible and can be agreed by the project manager with the Owner. The documentation practices should support the work and add value.

When the tasks specified for the project plan creation are completed and the project has finalized URS, the project can enter the gate meeting to have P2 approval to start the executing phase. The Project Manager will present the project plan in Level 4 meeting.

Executing

The Executing phase is not in the scope of the thesis but as the framework for Bayer Turku is built to support the whole lifecycle of a project, it is presented in the Table 1. The emphasis at this stage is to follow the progress of the project and update the plan accordingly. Also predicting the project progress must be at the Project Managers to-do list. Project Managers should follow the status as agreed with the project team at the project plan. In the executing phase there is a milestone called “go-live readiness”. At this milestone, the project will go live if the project maturity is at good level. After this, there is for example a so called hypercare period of a few weeks when the project resources are still supporting operations to use the new system or process.

In the executing phase, the difference between the project categories S and M is in the updating of the plans. In smaller projects it is not required to have all separate plans to be updated if the project manager does not see that as a beneficial for the success of the project. In the category M project, it requires that the plans are updated regularly when the project moves forward and more visibility is gained.

Closing

The closing phase project management, regardless of the project category, requires mostly the same management tasks to be performed. The final project report will be created by the project manager and the project team. However, in category S project, the final report is not that detailed as the management of the project has been most likely light. What is important despite the project category is to conduct a lessons learned and document that to the project

final report. In all projects in order to see if the planned value for the business was reached, a stakeholder satisfaction survey should be conducted as well. In category S project the survey most likely is quite short but in category M it might bring some insights for the future projects in order to enhance the project success chances.

The project closing is done in a structured way by creating the final report and collecting and analyzing the lessons learned. At the end, level 4 approves the project closing and the project team is officially released from the project.

Post Evaluating

The last lifecycle phase in the Bayer project lifecycle process is related to portfolio management. At this stage, the project owner is responsible for comparing the business case with the realized business case and check if the identified project benefits were realized. It is also important that the future projects are learning from the past experiences. The process lifecycle for a project ends after the Gate PE is approved.

7 SUMMARY AND CONCLUSIONS

7.1 Current state

Running projects is a business critical issue for ensuring the success in a current business world. Projects should be started based on the strategy importance and run through efficiently and then released to normal business processes. However, the current way of how projects are started and selected at Bayer is not supporting this business criticality linkage requirement.

The project and portfolio management culture are not that mature in Bayer Turku. The need to develop the culture further has been realized at the Supply Center and in PS-IT simultaneously. For this reason, the thesis will create a scalable framework for project management that can be used in Bayer Turku despite the organization in question. The project world at Bayer Nordic PS-IT in Turku is becoming more complex and more efficient way of working is seen as a priority requirement in order to be able to support Supply Center Turku with the level that is expected and required in order to keep the production running with ever rising speed.

Product Supply IT is a supporting function to Supply Center Turku. The supporting function has a role as a key player in the success of project management in Supply Center projects. However, PS-IT can also identify projects that can be seen as strategical for the future success of Bayer Turku.

The current way of working in PS-IT projects is not structured at the level of details it should be. PS-IT projects are in many cases run as ad-hoc projects. The gates from Initiating to Executing are fairly low and the structure of standardized Project management is missing. There are no templates that would be used in all projects, no proper planning of the project is done and the feasibility of the project is not checked. All project managers are inventing their own wheel when a project is started and this causes occasionally more work if a specialist is working in multiple projects and is trying to figure out where the information is and how it should be managed. It could be said that the PS-IT projects are started with minimal bureaucracy but that is then leading into situation where the through-put time is in most cases much longer than planned and the success rate of projects is quite low.

The Project Management Office (PMO) is just starting and due to the lack of an agreed and followed processes projects are not always selected and started based on their strategical meaning for the company. However, there are multiple project ideas that are coming from Bayer Supply Center's strategy so these linkages exist. Prioritization of IT projects is typically done by the head of department at Nordic IT based on the experience and intuition rather than with a structured evaluation process. There is however so big number of simultaneous projects running and even more projects on the pipeline and therefore the requirement for the common PMO is evident.

Complexity of the project management and PMO processes on PS-IT derives from the linkage between Supply Center Turku and Nordic PS-IT as presented in Figure 2 Linkages between Bayer Nordic SE and Bayer Oy Portfolio and Project Management. PS-IT process should be applicable to other IT related Nordic-wide projects as well and at the same time it should be designed to support Supply Center's Project management process which is also under development pressure for the same reasons as PS-IT: a high number of projects which are not properly managed.

7.2 Strengths and Weaknesses

The current state of the PS-IT portfolio and project and portfolio management based on the data gathered during the interviews is analyzed with SWOT analysis which was presented in Figure 25 SWOT analysis for current state. The SWOT analysis revealed that Bayer Turku has a strengths in the strategy alignment of new projects and project prioritization is done based on the strategical importance. However, the weaknesses were very highly related to project management practices and the the lack of thorough planning. The resourcing situation was also seen as problematic when the resources are assigned to multiple projects simultaneously.

During the thesis creation the opportunity arise to enhance the project management throughout the whole Bayer Turku. The Project Management Enhancement –project was launched and the standardization of project management practicalities is seen needed. Not so many threats were identified; the only one was related to the multiple information systems that are used at Bayer Nordic SE and at Bayer Oy.

According to Bonham (2014, 23 - 25) despite the separation and different functions of IT projects, the IT project portfolio should be also part of corporate project portfolio management in order to align the IT projects with corporate strategy. This was also a conclusion from the interviews with IT professionals as well as with PMO and Project Managers at Bayer Turku. Bonham explains that IT projects should be considered as support for business initiatives and not pure IT initiatives, which can be accomplished if the IT projects and IT project portfolio are managed together with the same process as Turku Supply Center projects and portfolios.

The interviews brought up the need to have only the projects running that we really should have running. According to Feldman (2012, 29) lean in project management encourages projects to fail fast. It is leaner to focus to the outcome of a project and whether that project should be even run. In lean project management the results are measured and challenged through build-measure-learn loop. The introduction of a feasibility study to project management methods can be seen as a new leaner approach to project management. By concentrating in questions "can we do it" and "should we do it", the projects that have the best chances for successful execution are moving forward in the project process.

Lean is focusing on the flow efficiency. In the interviews it was stated that the resources are currently working in too many projects. This is also caused by the fact that too many projects have been started at the same time with the scarce resources. To have a dedicated project team increases the communication level, which then improves the project results through constant feedback. (Jalali et al. 2016, 256.) In Gabriel (1997, 206-208) study the successful result for a lean approach in project management in multi-organizational project was agreeing on paper the project management principles. The developed framework will support to have a standardized method which also includes the project management methods to be agreed with project team.

7.3 Development plan

The thesis interviews brought up the need to have a common project management framework as suggested in the literature as well. In some studies it is stated that a common project management approach should be used regardless of the type or the size of the project. Payne and Turner (1999, 55) state that the following advantages of having a common approach have been stated in the literature:

- Consistent reporting which is also comparable between different projects
- Resource calculations and capacity constraints are more consistent
- Resources can be moved from project to another more easily as the management style is the same in all projects
- Project managers can use smaller projects as training ground when managing larger projects.

Payne and Turner (1999, 56 – 57) discovered in their study that the size of the project and the used procedure correlated with the success of the project. They found out that with medium sized projects there was no difference in the success whether a standardized process was used which led them to make assumption that the standardized processes are designed considering medium sized projects. With small sized projects the success rate was higher if the project management process was designed for smaller projects.

Jalali et al. (2016, 253) suggest that tailored management methods are needed due to different size, complexity and uniqueness of the projects and the traditional project management methods are no longer efficient at current dynamic environment. However, according to Ahonen et al. (2015, 205), there is always at least some project management effort that needs to be done despite the project size. Here the project size is related to project length or project team size. The minimum a project or a complex task requires effort estimation and the task list in the form of work breakdown structure (WBS).

Bayer Turku has multiple projects that differ due to the size or the complexity. The requirement discovered in the interviews was there should be the least amount of

bureaucracy used for the project management. Hence it was clear that a common one-size-fits-all approach would not be usable for Bayer Turku.

In the literature few different ways of scaling projects are presented. According to Turner et al. (2010, 749) the project management method should be selected based on five parameters:

- Size of project
- Complexity of project
- Skill of project team
- Skill of customer
- Willingness of customer to pay.

For Bayer Turku, the scaling matrix was built based on the literature and the interviews. Clearly the definition of large or small projects is not one-dimensional and cannot be done with only one characteristic. Josey and England (2009) describe in article how company Progress Energy realized that it was required to have a standardized project management approaching with defined tools and processes including training and qualifications in order to execute projects successfully. The approach was the Project Profile Matrix. In this approach, there are four different ranges: small, medium, large and “mega” projects. Josey and England defined projects with two dimensions: project size and project complexity. In project size dimension the project duration, the risk and a total cost are classifying dimensions. (Josey and England 2009).

The interviews suggested that the same two dimensions were usable at Bayer Turku as well and therefore two tables were built. One table to think about the size of the project and the characteristics that define it, and one to define the project complexity factors.

The characteristics that define the size were selected to be duration, resources and project cost. These three come from the basic project triangle. The selected content for each can be fine-tuned after the approach is taken into use, but Figure 28 Matrix of Project Size describes the current understanding of each level.

Project complexity was considered based on the literature and interviews as well. As Bayer is running multiple projects at the same time one critical factor for project complexity was the dependency to other projects which are presented in Figure 29 Matrix of Complexity. The number of stakeholders make the project more complex as well. In case of more stakeholders are involved, the project team and the requirement for communication rises. The last characteristic in the project complexity is the degree of difficulty. The difficulty arises if there are new processes or new technologies to be introduced.

Based on these two dimensions a Bayer Project Scaling Matrix was built that categorized projects S, M and L. This Matrix was then developed further in to concrete deliverable list that defines the differences in the project categories S and M. The category L is out-scoped from the thesis as for these projects there exist Bayer Global Project Management standards such as PES (Project Execution System) for large investment projects and Frame IT for large IT projects.

If a project is category L but these global approaches do not apply, the project management method is using category M if seen beneficial.

The portfolio and project management framework for Bayer Turku was developed as a common project. The project will continue until the end of 2018 and therefore the framework table (Table 1 Bayer project deliverable list) is a snapshot from the project deliverable but this table can still be enhanced when the project continues.

The project framework presented in the thesis will be part of the portfolio and project management culture change. It is not enough to develop a framework but Owners and Project Managers must start to use the framework and then it can be also developed further, as the PDSA cycle suggests. The continuous improvement must be also applied for portfolio and project management work at Bayer Turku. The most important thing is that the momentum for this kind of big culture change is now and the work has been successfully started. It will be interesting to see how the culture change will proceed and the newly developed framework is taken into use.

REFERENCES

- Aaltola, J., Valli, R. 2010. Ikkunoita tutkimusmetodeihin I. Metodin valinta ja aineistonkeruu: virikkeitä aloittelevalle tutkijalle. PS-kustannus. WS Bookwell Oy. Juva.
- Ahonen, J., Savolainen, P., Merikoski, H. and Nevalainen, J. 2015. Reported project management effort, project size and contract type. *The Journal of Systems and Software*, Vol 109, pp. 205 – 213.
- Alsudiri, T., Al-Karaghoul, W., Eldabi, T. 2013. Alignment of large project management process to business strategy. *Journal of Enterprise Information Management*, Vol. 26(5), pp. 596 –615.
- Azanha, A., Argoud, A., Camargo Junior, J., Antonioli, P. 2017. Agile project management with Scrum. *International Journal of Managing Projects in Business*, Vol.10(1), pp.121-142.
- Bayer internet site, 2018. www.bayer.com, accessed 11.9.2018.
- Von Behr, T., Mustikkamäki, R. 2017. Perinteinen vastaan ketterä. *Projektitoiminta*, 2/2018, pp 8 – 11.
- Bonham, S. 2014. IT Project Portfolio Management. Artech House. ProQuest Ebook Central.
- Bonnie, E. 2014. Fundamentals of the Scrum Methodology. <https://www.wrike.com/blog/fundamentals-of-the-scrum-methodology/>, accessed 20.6.2018
- Collyer, S., Warren, C.M.J., 2009. Project management approaches for dynamic environments. *International Journal of Project Management*, Vol.27, pp. 355 – 364.
- Enoch, Clive. Project Portfolio Management : A Model for Improved Decision-Making, Business Expert Press, 2015. ProQuest Ebook Central, <http://ebookcentral.proquest.com/lib/turkuamk-ebooks/detail.action?docID=2189477>.
- Gabriel, E. (1997). The lean approach to project management. *International Journal of Project Management*, Vol.15, pp 205-209.
- Feldman, J. (2012). Project management gets lean. Informationweek - Online, Retrieved from <https://search-proquest-com.ezproxy.turkuamk.fi/docview/920356758?accountid=14446>
- Ferguson, C. 2011. PRINCE2® for small-scale projects. <https://www.axelos.com/case-studies-and-white-papers/prince2-for-small-scale-projects>, accessed 10.8.2018
- Hirsjärvi S., Hurme, H. 2008. Tutkimushaastattelu. Teemahaastattelun teoria ja käytäntö. Gaudeamus. Helsinki University Press.
- Hirsjärvi, S., Remes, P. and Sajavaara, P. 2007. Tutki ja kirjoita. 13., osin uud. p. Helsinki: Tammi
- Jalali Sohi, A., Hertogh, M.J.C.M, Bosch-Rekveltdt, M.G.C., Blom, R., Serpell, A. and Ferrara, X. 2016. Does Lean & Agile Project Management Help Coping with Project Complexity?, Proceedings of the 29th IPMA World Congress WC2015
- Josey, W.C & England, K. 2009. Utilizing a Project Profile Matrix to Determine Project Management Requirements, PMI Global Congress 2009, North America, Orlando, Florida, USA. <https://www.pmi.org/learning/library/utilizing-project-profile-matrix-pm-requirements-10598>, accessed 10.8.2018
- Joslin, R., Müller, R., 2015. Relationships between a project management methodology and project success in different project governance contexts. *International Journal of Project Management*, Vol.33, pp. 1377 – 1392.

Järvi, K. & Kosonen, J. 2017. 3 askelta ketterään projektijohtamiseen. *Projektitoiminta*, 2/2018, pp 8 – 11.

Kananen, J. 2014. Laadullinen tutkimus opinnäytetyönä. Miten kirjoitan kvalitatiivisen opinnäytetyön vaihe vaiheelta. Suomen Yliopistopaino Oy – Juvenes Print.

Kozlowski, R. and Matejun, M. 2016. Characteristic features of project management in small and medium-sized enterprises, *E+M Ekonomie a Management*

Modig, N. & Åhlström, P. 2019. Tätä on Lean. 7. edition. Sweden: Rheologica Publishing.

Ojansalo, K., Moilanen, T., Ritalahti, J. 2015. Kehittämistyön menetelmät. Uudenlaista osaamista liiketoimintaan. Helsinki. Sanoma Pro Oy.

Payne, J.H. and Turner, J.R. 1999. Company-wide project management: the planning and control of programmes of projects of different types, *International Journal of Project Management*, Vol. 17 No. 1, pp. 55 - 59.

Racnasis, A., Berzisa, S. 2015. Adaptation of Agile Project Management Methodology for Project Team. *Information Technology and Management Science*, 18(1), pp. 122 - 128.

Saddington, P. 2012. The Agile Pocket Guide : A Quick Start to Making Your Business Agile Using Scrum and Beyond, John Wiley & Sons, Incorporated, 2012. ProQuest Ebook Central, <https://ebookcentral.proquest.com/lib/turkuamk-ebooks/detail.action?docID=947659>.

Schei, K. 1990. Small Project Management. *Civil Engineering*, 60(1), pp. 42.

Snyder, C. 2013. A user's manual to the PMBOK guide-- fifth edition, ProQuest.

Torkkola, S. 2016. Lean asiantuntijatyön johtamisessa, Talentum Pro.

Turner, R., Ledwith, A., Kelly, J. 2010. Project management in small to medium-sized enterprises: Matching processes to the nature of the firm. *International Journal of Project Management*, Vol.28(8), pp. 744-755.

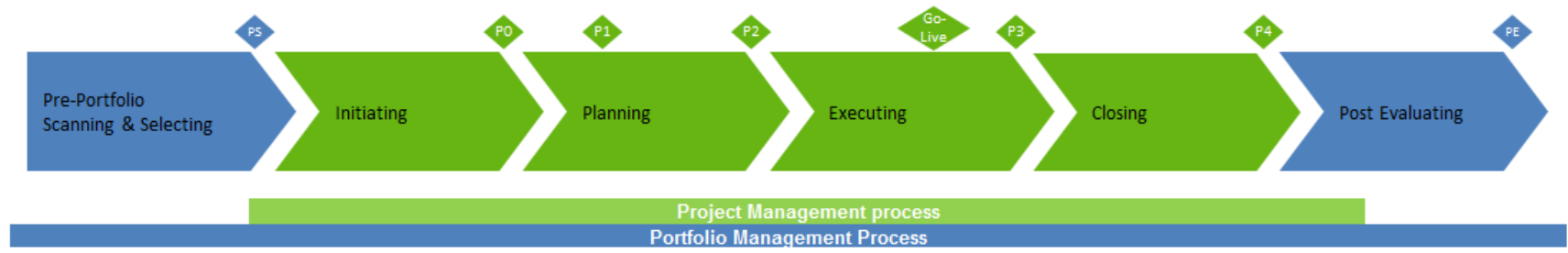
Turner, R., Ledwith, A., Kelly, J. 2012. Project management in small to medium-sized enterprises: Tailoring the practises to the size of company. *Management Decision*, Vol.50 (5), pp. 947 - 957.

What is Lean?, accessed 2.7.2017. www.lean.org/whatslean

Project Management Triangle, accessed 13.8.2018. https://en.wikipedia.org/wiki/Project_management_triangle

Young, R., Young, M., Jordan, E., O'Connor P. 2012. Is strategy being implemented through projects? Contrary evidence from a leader in New Public Management. *International Journal of Project Management*, pp. 887-900.

Bayer Project Framework



Symbol	Description
●	Mandatory
○	Optional
◐	Rough

Phase	Description	Definition	S	M	L	Deliverable	Responsible	Accountable	Contribute	Informed
Scanning and Selecting	Need or Idea selection driven by strategic goals and aligned with the yearly budgeting process. Deciding whether to continue or stop the idea and whether the development is done as a project or a line activity. Nominating project owner.	Create Selection One-Pager	●	●	●	Selection One-pager	Need Owner	PMO	SME	Impacted function leads
		Define High Level Scope	●	●	●					
		Define business reason (qualitative and quantitative benefits)	●	●	●					
		Define strategic alignment	●	●	●					
		Define rough business case	◐	◐	◐					
		Identify costs on high level	◐	◐	◐					
		Define preliminary project resources on a pool level	●	●	●					
		Create initial schedule target	◐	◐	◐					
		Create impact analysis (high level)	◐	◐	◐					
		Identify risks on a high level	◐	◐	◐					
Gate PS: Need Go / NoGo Approval							Need Owner	Level 4		
Initiating	Processing the Need in order to obtain approval for project initiation. Preparing a project charter, including vision and the scope statement, initial budget and resource needs and business case. Project charter is a project order and considered as a handover document from ordering unit to delivery unit	Create Project Charter	●	●	●	Project charter	Project Owner	PMO	Project Manager, Line Managers, Stakeholder, SMEs, Controller	
		Identify stakeholders initially	●	●	●					
		Define project scope and business goals	●	●	●					
		Define project targets and success criteria	●	●	●					
		Define resources for planning	●	●	●					
		Nominate a project manager	○	○	○					
		Define high level schedule	●	●	●					
		Validate and maintain high level risks (prioritize project triangle)	●	●	●					
		Define possible assumptions and constraints	●	●	●					
		Define business case for project justification	●	●	●					
		Define need for steering group	○	●	●					
		Scale the project	●	●	●	Scale matrix				
Gate P0: Project Start Approval							Project Owner	Level 4		Project team

Planning	Kick off the project and establish a project team. Depending on the project, a feasibility study and a solution concept is created before the project is able to proceed with the project plan creation.	Create Feasibility study	○	●	●	Feasibility study	Project Manager	Project Owner	Project team, SME	Impacted Function Leads	
		Create URS	●	●	●						
		Establish steering group		●	●						
		Establish a project team	●	●	●						
		Organize a project kick-off	●	●	●						
		Define business problems and opportunities		●	●						
		Define business requirements		●	●						
		Define possible solutions	◐	●	●						
		Score the solutions and decide implementation option		●	●						
		Specify preliminary requirements	●	●	●						URS
Gate P1: Project Concept Readiness (Optional)							Project Manager	Project Owner		Project team	
Planning	Create a Project Plan that responds to the business need. Project plan includes finalized and detailed description of project scope and work breakdown, schedule, cost and resource needs. It covers also other critical project success factors such as stakeholder analysis and plans for communication, change management, quality management, training and risk management.	Create Project Plan	●	●	●	Project Plan	Project Manager	Project Owner	Project team	Line managers, Impacted Function Leads, SMEs	
		Verify and finalize project scale	●	●	●						
		Finalize stakeholder mapping	◐	●	●						Stakeholder analysis and communication plan
		Define stakeholders expectations and power of influence		●	●						
		Define stakeholder communication plan	◐	●	●						
		Define project goals that response to the business needs	●	●	●						
		Define deliverables: detailed in-scope, out-scope	●	●	●						
		Define resources for execution	●	●	●						
		Assign roles and responsibilities to the project team	◐	●	●						
		Specify project phases with deliverables		●	●						
		Create work breakdown structures	◐	●	●						
		Create tasks	◐	●	●						
		Define detailed schedule plan	●	●	●						
		Define project management change process	●	●	●						
		Define project management quality plan		○	●						

		Define documentation practises	◐	●	●					
		Create training plan	○	○	●					
		Create risk management plan	◐	●	●					
		Define business case for cost controlling	◐	●	●					
		Specify final requirements	●	●	●	URS				
Gate P2: Project Plan Approval							Project Manager	Level 4 meeting	Project Owner	Project team
Executing	Executing the project deliverables according to the project plan. The phase includes monitoring and controlling of the execution. Ready for Go-live milestone is determined when the project deliverables are available for the production use for the first time. Executing phases closes when production-critical fixes are done and non-critical fix plan is created	Follow up schedule	●	●	●	ProjekTori update	Project Manager	Project Owner	Project team	PMO, Line Managers, Impacted Function Leads
		Follow up and execute tasks	●	●	●	Project plan				
		Follow up costs	◐	●	●	ProjekTori update				
		Follow up resourcing	●	●	●	ProjekTori update				
		Create regular status reports		●	●	Status report				
		Organize Regular status-meetings	●	●	●	Meeting minutes				
		Organize Regular steering group meetings		○	●	Meeting minutes				
		Contribute to Monthly PSG meetings	●	●	●	ProjekTori status update				
		Follow up communication plan	◐	●	●	Communication register				
		Control risks and maintain risk management plan	◐	●	●	Risk analysis				
		Train users		○	○	●			User guide, SOP, End user training event(s)	
Milestone: Go-Live Readiness							Project Manager	Project Owner		Project team

Executing	Monitor and follow up the deliverables in production during agreed time period (Hypercare) and fix the critical issues	Hypercare: Monitor the deliverables in production and act	●	●	●	Project Manager	Project Owner	Project team	PMO, Line Managers, Impacted Function Leads	
		Fix critical issues during the Hypercare period (Change Control!!!!)	●	●	●					
		Create a fix plan for non-production critical issues	●	●	●					
		Handover to customer	●	●	●					
Gate P3: Deliverables complete Approval							Project Manager	Level 4 meeting	Project Owner	
Closing	Closing the project after a successful Hyper care (follow up) period. It includes summarizing the project history to a final report, organizing lessons learner and conducting a stakeholder satisfaction survey. After Project closing approval, project team is released for new challenges.	Create Project Final report	●	●	●	Project Manager	Project Owner	Project team	PMO, Line Managers, Impacted Function Leads	
		Document lessons learned	●	●	●					
		Conduct stakeholder satisfaction survey		●	●					
		Release project resources	●	●	●					
Gate P4: Project Closing Approval							Project Manager	Level 4 meeting	Project Owner	Project team
Post Evaluating	Conducting a post evaluation of the targeted business benefits from the initial Need setting, analyzing the change, positive/negative business impact and lessons learned for future development projects	Compare realized business case to project justification business case	●	●	●	Project Owner	Level4 meeting	Project manager	Project team	
		Compare original business benefits to realized business benefits, incl. Qualitative benefits	●	●	●					
		Learn for future projects and archive project	●	●	●					
Gate PE: Post Evaluating Approval							Project Owner	Level 4 meeting	Project Manager	

