



**Agile Development and Requirements Change Management in Enterprise
Performance Management Modelling**

Master's Thesis

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ABSTRACT

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Changing business environments have pressured companies to improve their strategy execution and to utilize tools to adjust their strategy to changing environment. Enterprise performance management (EPM) system can be utilised as a tool for executing and adjusting a company's strategy in the short and long term. EPM as a phenomenon has been researched widely but the development of EPM systems have not been researched in detail. This thesis aims to determine the main stages of EPM system development, research how agile methodology supports the development of EPM systems and what are the best practices for requirement change management in EPM system development.

This thesis consists of two parts. The first part is a literature review that focuses on peculiarities of EPM system development, theories of agile methodology and requirement change management practices. The second part of the study is a qualitative research executed as semi-structured interviews. Interviewees are employees of a consulting company providing EPM system development as a service. The results of the interviews were used to analyse EPM system development in practice.

The results of the study reveal that agile methodology suits well development of EPM systems. The main stages of EPM system development are analysis, planning, implementation testing and maintenance & enhancements. These stages should be performed iteratively. Requirement change management should be performed as a formal process.

TIIVISTELMÄ

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Tuotantotalouden koulutusohjelma

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Alati muuttuvat liiketoimintaympäristöt ohjaavat yrityksiä parantamaan strategian toteutustaan ja sopeutumaan muuttuvaan liiketoimintaympäristöön. Suorituskyvyn johtamisjärjestelmiä voidaan käyttää työkaluna niin strategian toteuttamisen kuin sen sopeuttamisen muuttuvaan ympäristöön lyhyellä ja pitkällä aikavälillä. Suorituskyvyn johtamista ilmiönä on tutkittu laajasti, mutta suorituskyvyn johtamisjärjestelmien kehittämistä ei ole tutkittu paljoakaan. Tämän diplomityön tavoitteena on määritellä suorituskyvyn johtamisjärjestelmien kehittämisen päävaiheet, tutkia kuinka ketterän kehityksen menetelmät tukevat tätä kehitystä ja mitkä ovat parhaat menetelmät muutostenhallintaan suorituskyvyn johtamisjärjestelmän kehityksessä.

Diplomityön kirjallisuuskatsaus keskittyy suorituskyvyn johtamisjärjestelmien erityispiirteisiin, ketterän kehityksen menetelmiin sekä muutostenhallinnan periaatteisiin. Työn empiirinen osa on laadullinen tutkimus, joka on toteutettu puolistrukturoiduilla haastatteluilla. Haastateltavina oli suorituskyvyn johtamisjärjestelmien kehitystä palveluna tarjoavan konsultointiyhtiön työntekijöitä. Haastatteluista kerätyn datan avulla analysoitiin suorituskyvyn johtamisjärjestelmien kehittämistä käytännössä.

Tutkimuksen tulokset osoittavat, että ketterän kehityksen menetelmät tukevat suorituskyvyn johtamisjärjestelmien kehittämistä merkittävästi. Suorituskyvyn johtamisjärjestelmän kehittämisen päävaiheet ovat analyysi, suunnittelu, toteutus, testaus ja ylläpito. Näitä vaiheita tulisi suorittaa iteratiivisesti ja muutostenhallinta tulisi suorittaa muodollista prosessia hyödyntäen.

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Stockholm, 24.11.2021

Pyry Peura

ABBREVIATIONS

ARCM	Agile Requirements Change Management
BI	Business Intelligence
BSC	Balanced Scorecard
CRM	Customer Relationship Management
CSD	Customer Success Director
DSR	Design Science Research
EPM	Enterprise Performance Management
ERP	Enterprise Resource Planning
KIF	Knowledge Intensive Firm
MVP	Minimum Viable Product
SaaS	Software as a Service
RCM	Requirements Change Management
RV	Requirements Volatility
xP&A	Extended Planning and Analytics

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1 Introduction

The purpose of this introductory chapter is to introduce the background, main topics, and objectives of this research. First background for this study is presented. The background subchapter explains the purpose of the study. Then research objective, research questions and scope are discussed. Thirdly methodology and data used in research are briefly presented. In the fourth and the last subchapter of the introduction structure of the thesis is explained.

1.1 Background

In 2020 a virus first spotted in China triggered a global COVID-19 pandemic. Pandemic has caused great damage to people's health, well-being, and jobs. Current generations have never experienced anything like the COVID-19 pandemic. Pandemic has also created huge disruptions to many companies' businesses. In the current situation, forecasting is crucially important for decision making. For example, mid- and long-term forecasts created are essential for supply chain planning. Due to the uncertainty caused by the pandemic companies and governments need to be able to create new forecasts in quick frequency. (Nikolopoulos et al. 2021)

It is not only a global pandemic creating uncertainty in the current business environment. Several forces cause uncertainty in today's business environment. For example, globalisation and the ongoing digital revolution cause unprecedented volatility and uncertainty. (Cokins, 2017)

Oliver & Parret (2018) highlighted that in uncertain environments strategic tools that enable scenario planning are vital for companies to succeed. Scenario planning also helps in developing a successful enterprise-level long-term strategy. The perspective gained from scenario planning helps executives to create long-term strategic directions for enterprises. (Oliver & Parret 2018)

Enterprise Performance Management (EPM) can be seen as a system that connects different data, analytics and planning done across an enterprise. EPM helps organisations

create enterprise levels forecast and helps in executing long-term strategies. (Dimon, 2013) According to Cokins (2017), EPM helps managers to notice and respond to unexpected changes more quickly.

Agile methodology was initially developed for software development. Nowadays agile methodology is being adopted by organisations seeking flexibility in various other fields than software development. (Annosi et al. 2020) Prior studies have researched how principles of agile methodology can be used in human resource management (Denning 2018), business intelligence (BI) (Krawatzeck & Dinter 2015; Hughes 2012) and digital transformation (Ghezzi & Cavallo 2020; Li et al. 2021). Agile methodology has been developed to meet the needs of a development environment where requirements can change rapidly. Iterative development utilized in agile methodology can help development teams to meet business needs in an uncertain environment. (Livermore 2008) Highsmith (2002) describes agile as a methodology that helps development teams to hit a moving target.

The requirements of a project are usually not fully clear at the beginning of a project. To meet requirement changes caused by changes in business rules or operating environment managing requirement changes well is crucial for the success of a project. (Jayatilleke & Lai, 2018). It is important in a project to accept changes in requirements. Accepting changes in requirements is the only way to achieve the satisfaction of a customer. Successful requirements change management is critical for a project team to be able to accept changes in requirements. (Akbar et al. 2019)

Druzhaev et al. (2019) conducted a study of principles of managing the development of EPM systems. Today EPM systems are used widely as they help management in strategic decision-making and improve information transparency in organizations. Although EPM systems are used widely there is not that much research conducted on the development of EPM systems. (Druzhaev et al. 2019)

Druzhaev et al. (2019) suggested for future research that the main stages of EPM systems development process should be determined. One of the main goals of this study is to identify these main stages of EPM systems development. During these times handling uncertainty is essential for organizations. This study investigates how agile methodology and well-handled requirements change management can be utilized in often complex EPM

system development projects. By identifying the main stages of the EPM system development process and how these stages can be performed utilizing agile methodology and best-of-breed requirements change management principles this paper will help in developing EPM systems that help organisations to execute their strategy in uncertain environments.

1.2 Research Objectives and Scope

This study aims to help companies to understand how to build insightful EPM systems that help in decision making and creating long-term strategies in uncertain environments. The object of this study is to identify the main stages of development of an EPM system and to determine how this development process can be managed using agile methodology and change management best practices. The findings of the study are used for defining the main stages of EPM system development. The case company is focused on creating EPM systems utilizing the Anaplan platform. With insights from this study case company should be able to improve its EPM system development processes.

To meet these objectives three research questions were formed. The research questions and their respective objects are presented in Table 1. The first question aims to identify the main stages of EPM system development. The objective of the second question is to identify key elements of agile methodology and how these suit peculiarities of EPM system development. The third question intends to evaluate best practices of requirement change management in EPM system development.

Table 1. Research questions and objectives

Research Question	Objective
1. <i>What are the main stages of EPM system development?</i>	<i>Identifying the main stages of EPM system development. Main stages of development can be used to understand how the development should be managed.</i>
2. <i>How the agile methodology supports EPM system development?</i>	<i>Identify the key elements of the agile methodologies and understand how EPM system development peculiarities affect utilizing these methods to create suggestion for development processes.</i>
3. <i>What are the best practices for requirement change management in EPM system development?</i>	<i>Evaluate the key elements of successful change management in development processes and how these elements can be utilized in EPM system development.</i>

Anaplan, Inc. is a Software as a Service (SaaS) provider that has created the Anaplan platform. Van Decker et al. (2020) have selected the Anaplan platform as one of the leaders in Cloud Financial Planning and Analysis solutions. Anaplan underlines the term “Connected planning” in central of its communications. Connected planning means connecting different performance management systems to create an environment where accurate and insightful forecasts and plans can be created. (Anaplan 2021a) Also Pidsley et al. (2020) introduced the term extended planning and analytics (xP&A). xP&A aims at connecting siloed planning systems to one ecosystem where plans can be used together more efficiently.

Terms connected planning and xP&A can be seen as new development “wave” of enterprise planning and EPM. In the empirical part this thesis will focus on these connected planning systems and how those can be developed for EPM purposes.

1.3 Methodology and Data

Saunders et al. (2016) defined the main characteristics of research shown in Figure 1. These characteristics will be followed in this study. Methodologies in this study are divided into two sections. The first section is a literature review that dives into research

conducted on agile methodologies and usage of those in development projects, principles requirements change management and peculiarities of EPM system development. The first section gives a solid groundwork for the second section which is an empirical study on how agile methodologies and requirements change management principles should be utilised in EPM system development projects.

The main research method of the empirical part of the thesis is semi-structured interviews. A total amount of seven employees of the case company participated in the interviews. Interviewees come from various backgrounds. Some of the interviewees come from a finance background and some of them have a more technical history but all of them currently work with developing EPM systems for various organisations. Based on the research and data gathered an analysis is conducted to evaluate how theoretical frameworks of agile development and requirements change management work in practice for EPM system development.

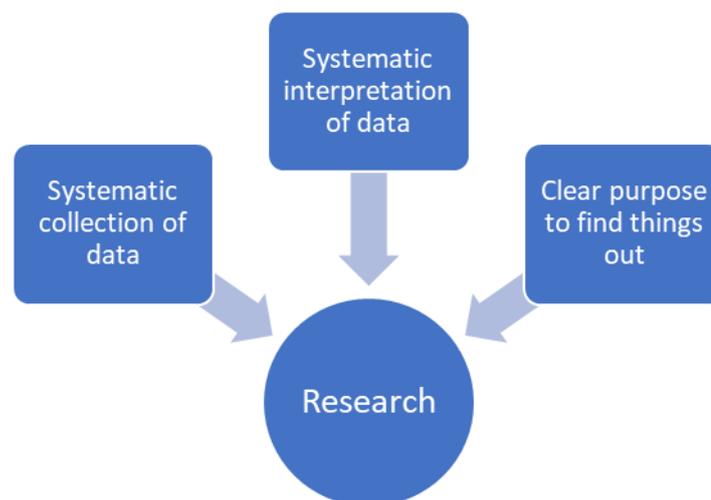


Figure 1. Characteristics of research (Adapted from Saunders et al. 2016)

In this study, the clear goal of both literature review and empirical research is to find out what could be the optimal way of developing EPM systems. To meet this goal data is collected and interpreted in a systematic way during the research.

In a study related to management, the research should bring together two realities—theory and practice. They might seem to be far away from each other, but both aim to create knowledge. (Dresch et al. 2015) Ford et al. (2003) highlighted the fact that management research often has only a minor impact on management practices and practising managers consult only rarely university-based research. Design science research (DSR) aims at creating research in which results can be used in practice. (March & Smith 1995)

DSR is a suitable research methodology when the desired goal is an artefact or a recommendation. (Dresch et al. 2015) DSR should always be relevant for the organization that it is conducted to, and the methodologies should be recognized by the academic community. In DSR there should always be created an artefact or a recommendation for a specific problem. (Hevner et al. 2004)

Offerman et al. (2009) stated that the most important parts of DSR are problem identification, solution design and evaluation of the solution. These parts of the process can be executed utilising different scientific techniques (Offerman et al. 2009). In this study, the problem is going to be identified using expert interviews. The solution is designed by information gained from literature research and expert interviews and solution is evaluated in conclusions chapter by summarising the results.

The research process is divided into eight steps that are presented in Figure 2. Two of the steps form the empirical part of the research. Results of the research are presented in the conclusions chapter of this thesis.

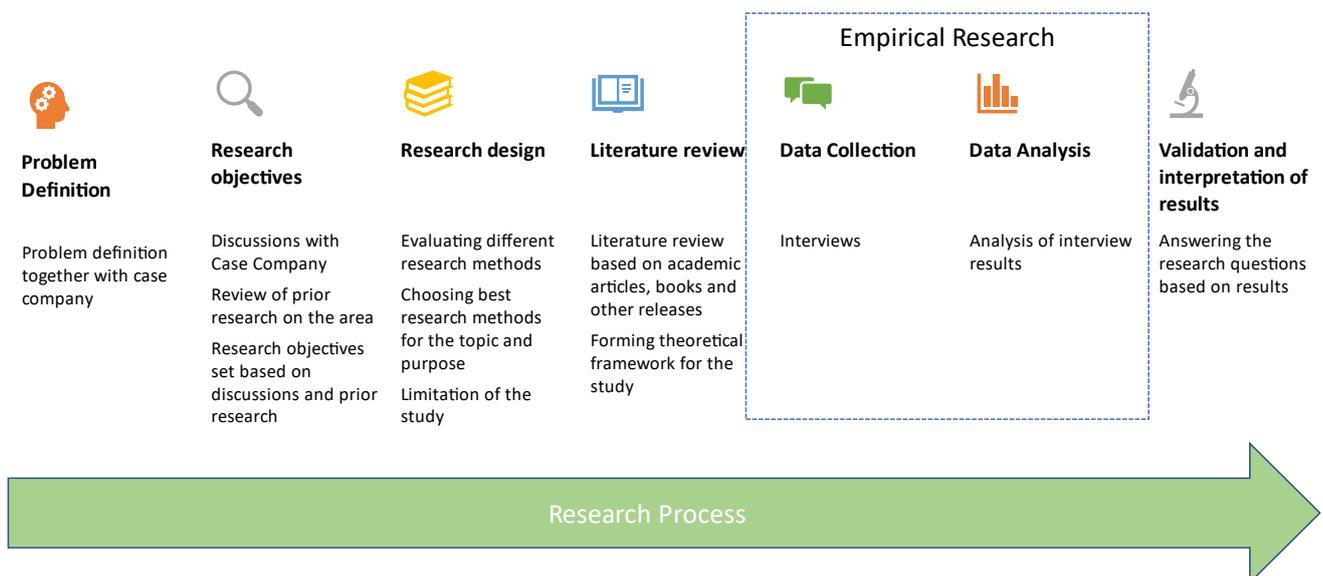


Figure 2. Research process of the thesis

Qualitative research provides intense, challenging, engaging, contextualised, highly variable, and non-linear data. Data gained from qualitative research can potentially produce productive fresh insights and a deep understanding of the research topics. Qualitative research is fundamentally suitable for case-oriented studies. The case-oriented way of research gives a good background on gaining a solid understanding of a researched phenomenon. (Bazeley 2013) Qualitative research can also be seen as an activity that locates the observer in the world. With the practices of qualitative research, it is possible to gain a better understanding of the studied subject. (Denzin & Lincoln 2000) When conducting qualitative research, it is often appropriate to first focus on theoretical frameworks that have already been researched in the field of the study. These frameworks can help to recognize what data should be collected for gaining insights appropriate for the goal of the study. (Yin 2018)

1.4 Structure of the Thesis

This report includes seven main chapters which are presented in Table 2. The first chapter is an introduction that explains the background of the study, sheds some light on the research methodology and structure of the report and gives general information about the report. The second, third and fourth main chapters conduct the literature review of the study. These chapters introduce main theories and phenomena which are used in the empirical research later in the study. The second chapter introduces the concept of EPM and investigates peculiarities of the development of EPM systems. The goal of the third chapter is to present the agile methodology and the most used frameworks presented in prior research. The fourth chapter studies best practices of change management introduced in the literature on the topic. These three chapters build the theoretical framework which is used as the theoretical background which is later used in developing suggestions for the EPM system development process.

Chapters five and six conduct the empirical part of this report. The fifth main chapter introduces the used research methods and presents the interview design of the research. The sixth chapter starts with an introduction to the case company's background. When the

reader understands the environment of the empirical study sixth chapter interprets and analyzes the interview results and focus on identifying the main stages of EPM system development and how the development process would be optimal to execute. The seventh and the last chapter concludes the summary and discussion of the report. In the last chapter answers to research questions and recommendations for the EPM system development process and future research possibilities are presented.

Table 2. Structure of the report

Input	Chapter	Output
Information of the background, methodology and structure of the thesis	Introduction	Research questions, objectives and scope, background, structure of the thesis
Literature of EPM to clarify the terminology and peculiarities of EPM systems	Enterprise Performance Management	Knowledge of EPM systems and peculiarities of EPM system development
Literature about agile development methodologies to clarify key characteristics of agile development	Agile Development	Knowledge of agile development practices and frameworks
Literature of change management to gain understanding of fields best practices	Change Management	Knowledge of best practices of change management
Literature of research methods and discussion of research design.	Research Design	Description of research methods and research design.
Data from the case company interviews and results of the literature review	Enterprise Performance Management System Development in Practice	Description how EPM system development works in practice and how agile methodology and best practices of change management fits in this process, Main stages of EPM system development process
Analyzed interview results and results of the literature review	Conclusions and Discussions	Answers to research questions, conclusions, recommendations for EPM system development process, and potential future research topics

In this report literature review presents the most important theoretical frameworks and phenomena that are used in the empirical part of the thesis. When the theoretical

background is presented, the frameworks are combined with the problem description of the case company which is followed by the research process. During the research EPM system development is investigated in practice and the study presents how the planned process which is based on literature review differs from the development process that works in practice. After the empirical part, the results of the study are summarized in the last chapter.

2 Enterprise Performance Management

This is the first chapter of the literature review. This chapter evaluates peculiarities and critical success factors (CSFs) of EPM system development. To familiarize the concept of EPM this chapter start with an overview of EPM, and terms related to it. After overview peculiarities of EPM systems development are evaluated. Lastly, CSFs of an EPM system implementation project are introduced.

2.1 Overview of Enterprise Performance Management

The simplest definition for Enterprise performance management would be “The translation of plans into results–execution”. EPM can be seen as a process that helps enterprises manage their strategy. (Cokins, 2004a) According to Frolick & Ariyachandra (2005), some see EPM only as a narrow concept that applies to planning, scheduling, and budgeting practices in an enterprise. Eckerson (2006) describe EPM as using a common strategic and technical framework, to help all parts of the enterprise drive toward a common set of goals and objectives. In this thesis, an EPM system is considered as a system that helps enterprises develop and execute their strategy by utilising for example planning, scheduling, and budgeting practices.

Turban et al. (2011) described EPM as an outgrowth of BI, enterprise information systems and decision support systems and as a part of a BI system. Parts of a BI system introduced by Turban et al. (2011) in Figure 3. According to Turban et al. (2011), EPM is an *integrated set of processes, methodologies, metrics, and applications designed to drive the overall financial and operational performance of an enterprise.*

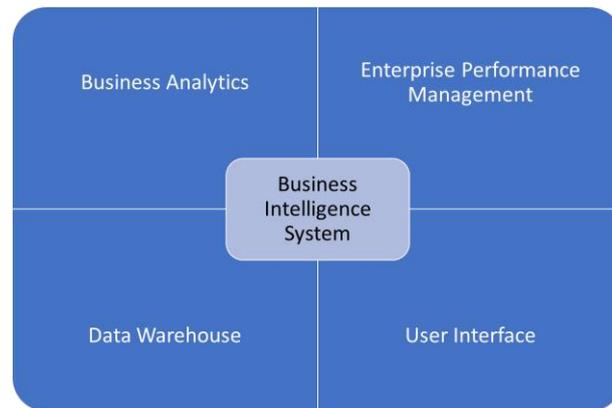


Figure 3. Business intelligence systems parts (Adapted from Turban et al. 2011)

Brache (2002) introduced the strategy framework presented in Figure 4. In Brache's framework, there are six questions that strategy should answer. EPM helps executives in all these questions but especially in questions four and five. EPM gives management insights on how to be successful and what the results of an enterprise can be. (Cokins, 2004a)



Figure 4. Strategy framework (Adapted from Brache 2002)

In literature enterprise performance management (EPM) systems are also called business performance management (BPM), corporate performance management (CPM) and performance management systems (PMS) (Druzhaev et al 2019). In this thesis, these systems that aim for performance management at the enterprise level are referred to as EPM systems for the clarity of the text.

Often companies create long-term goals but manage the company using short-term budgets and plans with no connection to long-term goals. This disconnect easily causes poor performance of strategy execution. This phenomenon is called the “strategy cap”. (Coveney et al. 2003) Kaplan & Norton (2008) stated that for an enterprise a strong linkage between operational activities and strategic objectives of the enterprise can provide a crucial competitive advantage. EPM targets to creating a loop that ties up this disconnect between long-term goals and short-term operational planning. EPM can help organisations struggling with “strategy cap” to execute their strategy properly. (Coveney et al. 2003; Cokins 2004b)

Dresner (2008) introduced the management cycle concept and how an EPM system can connect parts of this cycle. The management cycle, connective processes and activities are presented in Figure 5. Four cornerstones of the management cycle are Strategy & Vision, Goals & Objectives, Evaluation, and execution. According to Dresner these cornerstones with connective processes presented in Figure 5. form the basis for a modern management system. Also, Dresner highlights the fact that often vision & strategy created by senior management is not properly connected to other parts of the management system causing the execution of strategy to be doomed to fail. This is in line with the findings of Coveney et al. (2003).



Figure 5. Activities and connective processes supported by EPM system (Adapted from Dresner 2008)

Cokins (2009) visualised an EPM system as a loop presented in Figure 6. EPM system of Cokins has a lot of similarities compared to the management system supported by them EPM system that Dresner (2008) visualised. In Cokins' (2009) EPM system also customer relationship management (CRM) and enterprise resource planning (ERP) system are included in the loop.

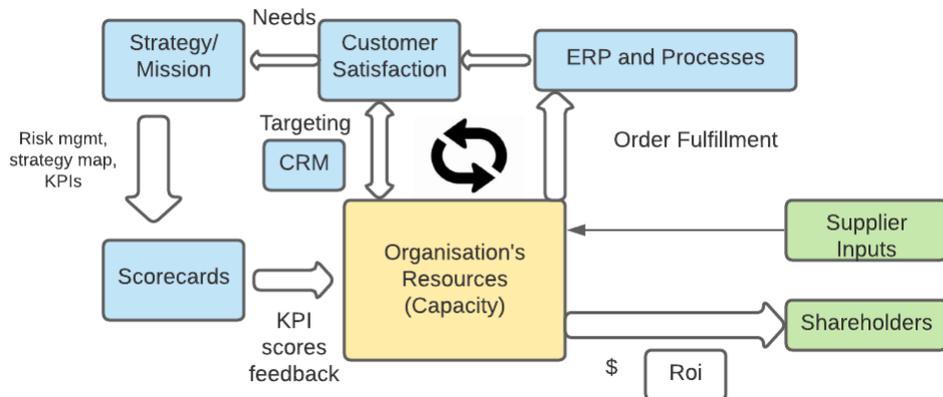


Figure 6. EPM system (Adapted from Cokins 2009)

From these two different models can be understood that an EPM system is a loop that is used continuously to support the execution of enterprises strategy and vision. EPM systems have also a direct relationship to different actions that happen in an organisation and are not independent systems with no connection to the rest of the organisation.

2.2 Peculiarities of Enterprise Performance Management System Development

Druzhaev et al. (2019) stated that there are two kinds of peculiarities affecting the development of EPM systems. The first ones are peculiarities related to the nature of EPM systems. Other peculiarities are related to managing the development of EPM systems. Both kinds of peculiarities affects the development process of EPM systems. This subchapter will review these peculiarities.

Peculiarities related to nature of EPM Systems

EPM refers to managing an organisations performance on an enterprise level. Creating a system for managing the performance of a whole enterprise is easily complex. (Cokins, 2017) The complexity of EPM system is highly related to the complexity of the organisation using the EPM system. Complex organisations require a complex EPM

systems whereas more simple organisations can manage with a less complex EPM systems. (Broadbent & Laughlin 2009) EPM system takes into consideration all activities of an organisation. Usually, each function has its own block in an EPM system causing the modular nature of EPM systems. (Neely, 200)

Highly optimized business units may not lead to optimized company. For this reason, the scope of an EPM system needs to be in managing the performance of an enterprise as a one. (Paladino 2007) This large-scale scope can be seen as one peculiarity of EPM systems nature. From the scope of an enterprise also tight integration between business units is needed (Ferreira & Otley 2009)

For many managers planning and seeing actual and planned values and variances in EPM system with all additional relevant information (Walker 1996) In many organisations planning horizon is between three to eight years (Wade & Recardo 2001) Whereas for example, traditional cash flow forecasting time horizon is usually maximum fifteen months (Glaum et al. 2016). Compared to this horizon of three to eight years is peculiar. This Long-term horizon of the data and planning is also in the nature of EPM systems.

One of the most used EPM systems is Balanced Scorecard (BSC) (Sharda et al. 2014). Kaplan & Norton (1992) introduced BSC as a measurement framework that drives enterprises performance. In BSC it is important that with traditional financial measures also non-financial measurements are used. This combination of financial and non-financial data is distinctive for EPM systems.

Numbers without context does not provide much information. In EPM systems the numbers and other information are given a context for example account, time period and organisation unit. This context is vital for the information to be meaningful. Context can be seen as the intersection of all dimensions of the data. In EPM systems data is stored in multidimensional databases, sometimes referred to as a “cube”. Data to this multidimensional database is sought from regular transactional databases like ERP, supply chain management systems and CRM. In cubes, data is aggregated which creates major benefits as sums are already calculated at all levels of the hierarchies. (Dimon 2013)

The most important peculiarities of EPM Systems nature include:

- Complexity
- Modular Structure
- Large-scale scope
- Integration between business units
- Long-term horizon
- Using both financial and non-financial data
- Using aggregated data.

All these peculiarities need to be taken into consideration during the development of an EPM system.

Peculiarities related to management of EPM system development

EPM systems focus on having an impact on the strategic and tactical decision making of enterprises. This can have a significant but indirect impact on the results and performance of the enterprises. For this reason, the benefits of an EPM system are difficult to be expressed in monetary terms. Costs of the development of an EPM system can be measured in monetary terms. This makes it difficult as monetary investment needs to be compared to the non-monetary benefits of an investment. (Druzhaev et al. 2019)

EPM systems are usually large and complex. These features create stochastic factors that influence EPM system development. Because of these stochastic factors classic project management methods, with a strict sequence of works and determined parameters are inapplicable for EPM system development projects. Instead of classic project methods it is reasonable to use development models which allow the /description of the stochastic parameters of the development. (Druzhaev et al. 2019)

2.3 Critical Success Factors of Enterprise Performance Management Implementation Project

For any business or a project, there is a limited number of areas where satisfactory results ensure the success of the project or the organisation. CSF can be seen as key areas where things must go right for the business or the project to flourish. (Rockart 1979) This definition of CSFs as areas of a project where satisfactory results are crucial for the successfulness of the project is adopted in this study.

Thilini et al. (2008) conducted a study on CSFs of an EPM project. 10 CSFs were identified. Next, these 10 CSFs are introduced.

Champion

A capable team is one of the most important factors towards the success of an EPM project. A champion or a business driver is the leader of the project team and the most important individual in the team. Champion is either the one who pitched the idea to the business sponsor of the project or one that the business sponsor asked to be the spearhead of the project. The champion must have strong knowledge of the business process and EPM concepts and excellent communication skills. The Champion must be enthusiastic and relentless towards the project. (Eckerson 2006)

Management of Resistance

Organisational issues in particular are one of the biggest pitfalls for any EPM implementation. (Hartlen 2004) EPM implementation can change existing power structures caused by new or modified processes and systems. The new processes and systems make information more transparent. Towards this change, there can be resistance. This resistance can damage the implementation and adoption. To avoid this resistance needs to be managed in an EPM project. (Frolick & Ariyachandra 2005)

Management Support

Top management support has long been recognised as being a crucial factor for project success (Doll 1985; Garrity 1963; Lederer & Mendelow 1988; Markus 1981; Rockart & Cresenzi 1984; Schmidt et al. 2001). According to the fuzzy set analysis of Young & Poon (2012), top management support is much more necessary than any other success factor for projects success. This is also understood in companies and usually started initiative is at least claimed to have the support of top management. The problem in failing projects is often that top management does not consider the project urgent or does not understand the project's intricacies. These factors indicate that top management claims to support projects that they really do not support or consider as a top priority for the business. (Biehl 2007)

Sufficient Resources

EPM project requires monetary, people and time resources. Effective EPM implementations span the entire organisation and require the implementation of integrated data management infrastructure. Such as infrastructure are usually expensive, time-consuming and resource-intensive. Part studies have shown negative effects of lack of sufficient resources to system development projects. Managing the right balance of sufficient resources are essential for the success of an EPM implementation. (Thilini et al. 2008)

Team Skills

A successful EPM project strives for both technical skills and process skills in the project team. Often organisations can create teams with great technical skills but lacking process knowledge. An EPM system is reflecting business processes inside the organisation, so the system needs to model those accurately. To get accurate models done the project team must have enough knowledge of the underlying business processes and to be able to technically create them in the EPM system. (Thilini et al. 2008)

User Support

Support from users during the implementation will increase satisfaction towards the system and benefits from the system. Also, support from users during the implementation increases user acceptance in the deployment phase of the system. (Guimaraes et al. 1992)

Effective Communication

Effective communications between IT and business are crucial for the success of an EPM project. Communications between business and IT help IT to understand business requirements and metrics that need to be captured in the system.

Clear Link to Business Strategy

EPM system's main function is to help an organisation to execute its strategy. Therefore, an EPM system must have a clear link to the organisations strategy. (Frolick & Ariyachandra 2006) Often organisations use metrics and KPIs that are easy and convenient to implement. Often these metrics are not tied to the strategy of the organisation. When an organisation is using non-optimal metrics in their EPM system they may not be monitoring organisations true performance. When an EPM system is used in a non-optimal way the advantages of using one are not achieved. To gain the best advantage of using an EPM system the metrics in the system must have a strong connection to the organisations strategy. (Thilini et al. 2008)

State of Existing Data Management Infrastructure

EPM projects are significantly easier for organisations that already have mature data warehouse architecture. The existing data infrastructure simplifies the integration of different data sources and most importantly provide reliable and useful data for specific needs. If there is no existing data warehouse infrastructure a considerable amount of effort in an EPM project is used to data searches and making data needed available. For these

reasons state of existing data management infrastructure is important to understand when beginning an EPM project. (Tonchia & Quagini 2010)

Evolutionary Development

In the development of complicated information systems evolutionary approach is usually the appropriate way to create a value-adding system. In evolutionary development in the beginning focus is just on very limited numbers of the most important and mandatory requirements. When the first requirements are fulfilled, feedback can be gathered and then extending the system with evolutionary steps can be started. (Marx et al. 2012) In an EPM project evolutionary development in stages can be used to gain quick wins and greater acceptance for the EPM project overall. (Thilini et al. 2008) The EPM project can be started for example with a focus on financial data and financial metrics and when the financial planning part is ready the project can move the focus on operational planning and other possible areas.

3 Agile Development

The second chapter of the literature review explores the concept of agile development. Firstly, the basics of the agile development framework are introduced. After this, the principles of the Scrum framework are presented. Lastly “The Anaplan Way” framework is presented.

3.1 Agile Methodology

2001 Beck et al. published the agile manifesto which aimed to explore better ways to develop software. In the manifesto four main values of agile development were published (Beck et al. 2001):

“Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan”

This manifesto was proposed to improve development processes compared to the traditional “waterfall” method. In the waterfall method, detailed requirements and execution plans are created at the beginning of a project and then executed sequentially without going back once a step is completed. Today development frameworks that follow the values and principles of the agile manifesto are known as agile techniques. (Rigby et al. 2016)

The main aspects of agile methods are simplicity and speed. An agile team can be identified as a team that development is incremental, cooperative, straightforward, and adaptive. The agile development team concentrates only on the functions needed at the beginning and aim to deliver them fast for feedback and the possibility to react to the feedback. (Abrahamsson et al. 2002)

Agile development accepts changes as a fact and seeks to meet requirements from changes in the workflow. In agile development process can be seen as a cycle that consists of parts of the development process. All phases of the process are visited in each cycle (Figure 7). The goal of each cycle is to deliver a working product that is incrementally better than the product before the start of the cycle. With this approach, the changes in requirements can be reviewed in each cycle. (Kuhrman et al. 2016)

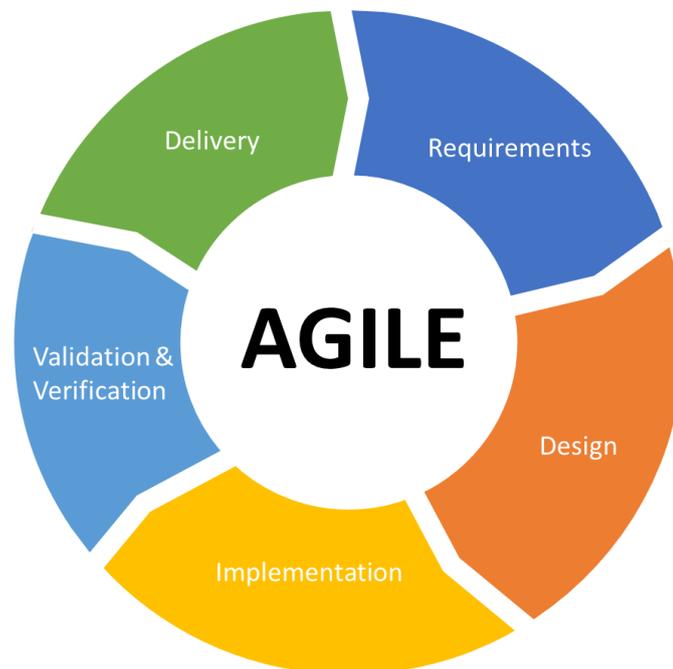


Figure 7. Phases of the agile process (Adapted from Kuhrman et al. 2016)

Royce (1970) presented a framework that could be used in the implementation of large computer programs presented in Figure 8. Royce himself did not use the term “waterfall” but the framework he introduced is widely referenced as “waterfall”. The Waterfall approach was one of the first formal delivery approaches utilised by the IT industry. (Measey et al. 2015) Waterfall methodology works well in a structured environment where requirements are stable. Whereas waterfall methodology does not work well in a dynamic and changing environment. (Moir 2020)

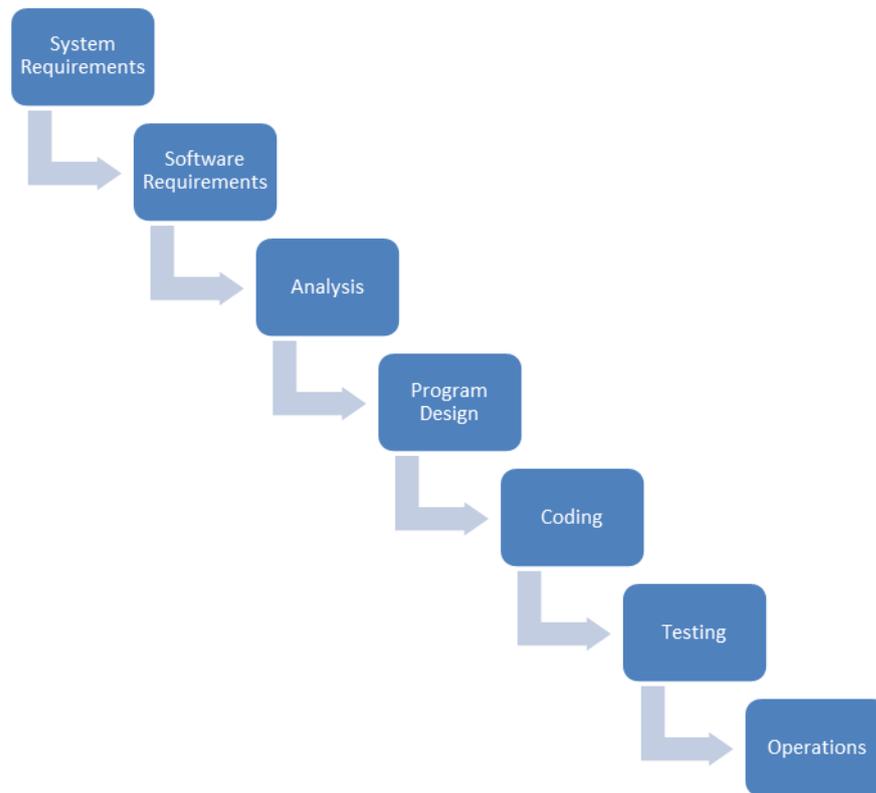


Figure 8. Waterfall Method (Adapted from Royce 1970)

In a BI project the main focus is on turning data into information. Traditional software development practises, like the waterfall model, have a focus on software development. This causes them to fail with BI projects as the software doesn't create the value – the information does. The nature of BI projects is iterative and incremental which suits agile methodology well. In BI projects value can be delivered with iterative time-boxed increments presented in Figure 9. (Larson 2009)

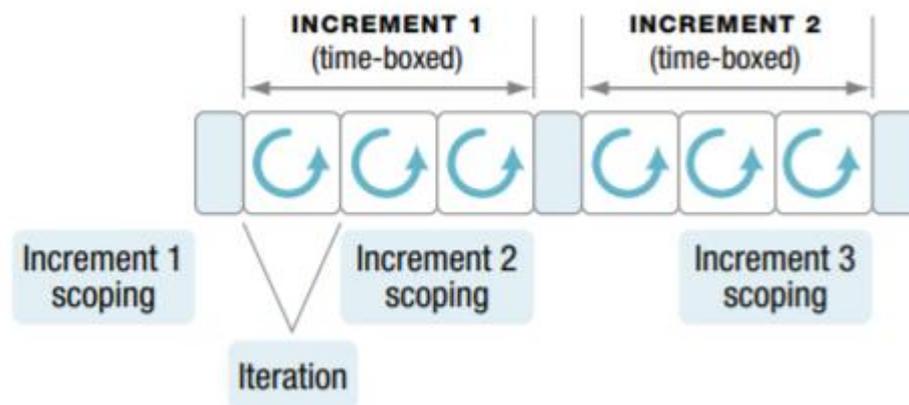


Figure 9. Iterative increment approach for BI development (Larson 2009)

BI delivery cannot be accomplished with traditional software development methods even though some organizations attempt that. BI development is more focused on data discovery and understanding how the information can provide value. This perspective drives how Agile methodology should be used in BI development. BI projects tend to be a process where customer expectations are a cycle of discovery and refinement. This nature of BI projects creates a problem of fuzzy requirements. The mindset of agile development suits this environment of BI development remarkably. (Larson & Chang 2016)

3.2 Scrum

1986 Takeuchi & Nonaka introduced The Rugby Approach which was a fast and flexible process for product development based on built-in instability, self-organizing project teams, overlapping development phases, “multilearning”, subtle control and organisational transfer of learning. Takeuchi & Nonaka (1986) described The Rugby Approach as a vehicle for introducing creative, market-driven ideas and processes into an old, rigid organization. The term The Rugby Approach was morphed to Scrum by DeGrace & Stahl (1991). In 1995 Schwaber introduced formalized Scrum development process that was based on The Rugby Approach introduced by Takeuchi & Nonaka in 1986. Schwaber (1995) introduced Scrum as an approach that increases flexibility and creates a process that

is responsive to both initial and additional requirements discovered during the development.

Scrum methodologies consist of the planning & system architecture phase, sprints, and closure presented in Figure 10. In planning & system architecture initially, a known backlog is constructed along with an estimate of projects schedule and costs and a high-level design for system architecture is created. Sprints focus on the development of new functionality. Sprints are nonlinear and flexible. Where available knowledge is used to build deliverables, otherwise trial and error are used to build knowledge. In a project, there are multiple iterative sprints that are used to develop the final product. A Scrum project is open for change in requirements until the closure phase. The deliverable can be changed at any time during the planning and sprints. In the closure phase product is prepared for release, final documentation is created, the product is tested and released. (Schwaber 1997)

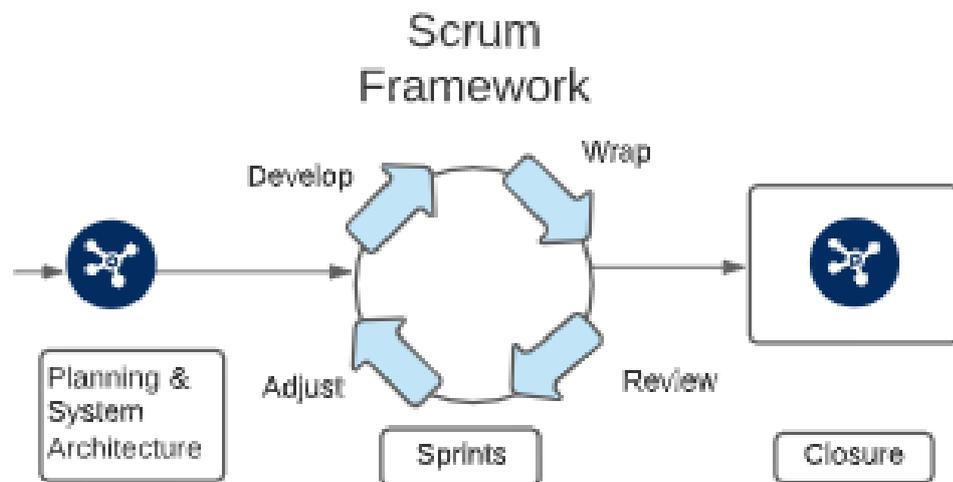


Figure 10. Scrum Methodology (Adapted from Schwaber 1997)

The three main components of Scrum are Scrum roles, Scrum artefacts and Scrum events. Scrum roles are the people and the relationships of a team that utilise Scrum methodology. Scrum artefacts and events are tools that Scrum teams use when following Scrum methodology. (Fowler 2019)

Scrum roles

Scrum roles form a Scrum team which is a fundamental unit of Scrum. The Scrum team consists of Scrum master, product owner and developers. Within a Scrum team, there is no hierarchies or sub-teams. The Scrum team is a unit of professionals focused on one goal at a time. The maximum amount of people in the Scrum team should be 10. Usually, smaller teams communicate better and are more productive. The Scrum team is together responsible for all product-related activities. (Schwaber & Sutherland 2020)

Developers are the individuals in the team that are responsible for creating a usable increment in each sprint of the implementation. Skills needed from the developer vary with the domain of the project. Developers are accountable for creating a plan for the sprints, creating quality work, adapting their plan each day toward the sprint goal and holding each other accountable as professionals. (Schwaber & Sutherland 2020)

A product owner is one-person whose responsibility is to maximise the value of the product resulting from the work of the Scrum team. For product owners' success, it's vital that the entire organisation respects their decisions. The product owner is accountable for developing and communicating the product goal, creating, and communicating product backlog items, ordering product backlog items, and ensuring that the product backlog is transparent, visible, and understood. (Schwaber & Sutherland 2020)

A Scrum master is an individual who is responsible for the Scrum team's effectiveness. Effectiveness is ensured by enabling the Scrum team to improve its practices, within the Scrum framework. The Scrum team is accountable for coaching the team members in self-management and cross-functionality, helping the Scrum team focus on creating high-value increments, causing the removal of impediments to the Scrum team's progress, and ensuring that all Scrum events take place and are positive, productive, and kept within the timebox. (Schwaber & Sutherland 2020)

Scrum Events

Sprints are containers for all other events at the same time being an event. All other events happen inside a sprint. Events are used to create regularity and to avoid the need for

meetings not defined in Scrum. The events in Scrum methodology are sprints, sprint planning, daily Scrum, sprint review, sprint retrospective. (Schwaber & Sutherland 2020)

Sprints are fixed length events of one month or less. A new sprint starts always right after the conclusions of the previous spring. Each sprint can be considered as a short project. During a sprint no changes that would endanger the sprint goal are done, quality does not decrease, the product backlog is refined as needed and scope may be clarified and renegotiated with the product owner as more is learned. A sprint can be cancelled if the spring goal becomes obsolete. The cancellation of a sprint can be done only by the product owner. (Schwaber & Sutherland 2020)

Sprint planning starts the sprint by determining what should be achieved during the spring. This plan is created with the collaborative work of the entire Scrum team. In the sprint planning meeting, the product owner ensures that attendees discuss the most important product backlog items and how they help to achieve the product goal. In the sprint planning, Scrum team defines a sprint goal which is the target for the sprint, the backlog items that are included in the scope of the sprint are decided and the work of the sprint is discussed. (Schwaber & Sutherland 2020)

Daily Scrum is a 15-minute meeting that is held every working day of the sprint. In the daily Scrum focus on progress toward the sprint goal and creating a plan for the next workday. Daily Scrum meeting is mandatory for developers. Product owners and Scrum masters can attend it if they are actively working with products in the sprint backlog. (Schwaber & Sutherland 2020)

Sprint review is used to inspect the results of the sprint and decide on future adaptations. In sprint review, Scrum team presents the achieved results of the sprint for the key stakeholders and the progress towards the product goal is discussed. Based on the information received from the presentation and discussions attendees of the sprint review collaborate on what to do next. (Schwaber & Sutherland 2020)

The sprint retrospective is an event which goal is to increase the quality and effectiveness of Scrum teams work and conclude the sprint. In the sprint retrospective, Scrum team discuss how the last sprint went and what went well during the spring, what problems occurred how those problems were solved or not solved. Based on these discussions Scrum

team identifies the most helpful changes to their way of working to improve teams' effectiveness. (Schwaber & Sutherland 2020)

Scrum artefacts

Scrum artefacts represent work or value. Artefacts are designed to maximise the transparency of key information. To ensure transparent and focused information each artefact contains a commitment. The artefacts of Scrum are product backlog, sprint backlog and increment. (Schwaber & Sutherland 2020)

The product backlog is an ordered list of what is needed to improve the product. The product backlog is the source of work undertaken by the Scrum team. The commitment of product backlog is the product goal. The product goal is a description of a future state of the product which is the target for the Scrum team to plan against. (Schwaber & Sutherland 2020)

The sprint backlog is a set of selected items from the product backlog that are planned to be implemented during a sprint. The sprint backlog is created by the developers and for the developers. The commitment for sprint backlog is the sprint goal. The sprint goal is the target for the products state in the end of the sprint. (Schwaber & Sutherland 2020)

An increment is a step towards the product goal. Each increment is additive to prior increments and is thoroughly verified. To ensure that increment provides value, the increment must be usable. The commitment for an increment is the definition of done. The definition of done is acceptance criteria which define the quality criteria for the product. When a product backlog item meets the definition of done it's considered as increment. (Schwaber & Sutherland 2020)

3.3 The Anaplan Way

The Anaplan Way is a methodology developed for the implementation of Anaplan models utilising the Anaplan platform (Anaplan 2021b). There is no prior scientific research conducted on the Anaplan Way. For this reason, this subchapter heavily relies on the material of Anaplan Inc. Case company of this study uses The Anaplan Way as the

foundation for their EPM system development processes causing The Anaplan Way to be highly relevant in the context of the study.

The Anaplan way highlights four cornerstones of implementation presented in Figure 11. All four cornerstones should be taken into consideration in all phases of the implementation project. Process cornerstone presents the surrounding business process that the EPM model supports. Data cornerstone includes all the master, meta, and transactional data needed for the EPM model. Model cornerstone means the design, build, and testing of the EPM model. Deployment cornerstone can be translated to having a plan to ensure the EPM model and surrounded business process are adopted in the organisation. As Anaplan is designed so that models can be built quickly it does not usually take the most time in the project. Process and data cornerstone take together approximately 70% of time spent on an implementation project. (Anaplan 2021b)

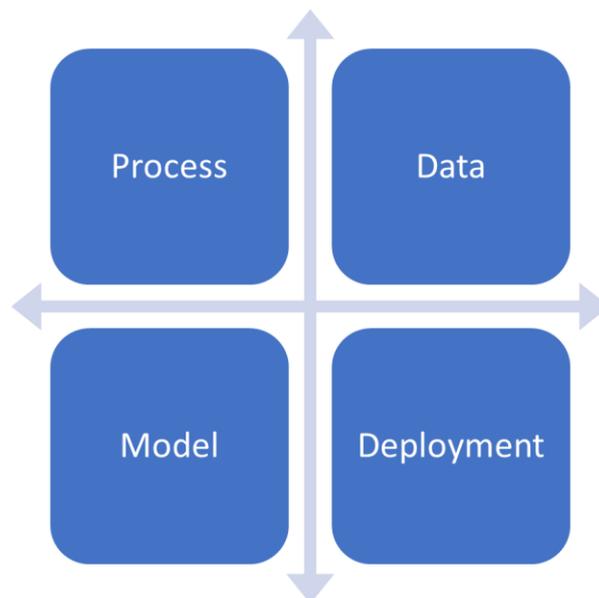


Figure 11. The four cornerstones of The Anaplan Way (Anaplan 2021b)

The Anaplan Way consists of five phases presented in Figure 12. Next, each phase of The Anaplan Way process is presented.



Figure 12. The Anaplan Way process (Anaplan 2021b)

The pre-release phase can be seen as preparation for the actual project. In the pre-release phase for example scope of the project, the project team and the project timetable are agreed. Also, other project-related assumptions as costs, billings and payment terms are agreed upon in pre-release phase. The change management process is agreed upon in the pre-release phase. (Anaplan 2021b)

The foundation phase can be considered as starting point for the development project. In the foundation phase, project planning and sprint planning are executed. In the foundation phase groundwork for the development is done as the initial model design is done, data integrations are determined, and process definition is created. (Anaplan 2021b)

In the implementation phase, the EPM system is built using iterative development with several sprints in a project. In the implementation phase, The Anaplan Way is following practises from Scrum methodology to ensure that the system is developed in the right direction. After several sprints, the implementation phase is ready and the built EPM system is ready for testing. (Anaplan 2021b)

In the testing phase, the developed EPM system is tested and verified. In the testing focus is on ensuring that the system works as users expects to it to work and also in the performance of the system. In the testing phase, customers accept the results of the projects. (Anaplan 2021b)

Deployment refers to the phase where the EPM system is implemented in daily business processes. In the deployment phase end users are trained to use the system, the model is

documented, feedback from user is gathered and the system is being monitored. (Anaplan 2021b)

4 Requirements Change Management

This third and last chapter of the literature review focuses on requirements change management (RCM). This chapter starts with an overview of what causes the need for RCM in a project. After that typical RCM processes are introduced. Lastly, concept of Agile RCM is explored.

4.1 What Causes Need for Requirements Change Management

Requirements are the basis for every project. Requirements define what the stakeholders need in a new system and what the system should do to meet these needs. The needs of different stakeholders might conflict. Conflicting needs should be evaluated, and an agreement of a common goal needs to be gained before the requirements are ready. Once requirements of a project are agreed they drive activities of the project. Without a stable base from the requirements a project can only flounder. (Dick et al. 2017) It is inevitable that the requirements of a project will change during the implementation of the project. These changes in requirements are both a risk for the success of a project but also a possibility to improve usability and value addition of the solution. (McGee et al. 2012)

Requirements volatility (RV) is a term closely related to RCM. Nurmuliani et al. (2004) defined RV as the tendency of requirements to change over time in response to the evolving needs of customers, stakeholders, organisation, and work environment. This definition of RV is adopted in this study. Dasanayake et al. (2019) identified that seven factors that contribute to RV: Ambiguous requirements, changing user needs, dynamic business environment, external dependencies, information distortion, ineffective communication and change of personnel. These factors can be grouped into three groups: factors related to information management, factors related to operational business domain and uncontrollable factors group. Some of the factors have immediate and easily foreseen volatility on the requirements while some of the factors rather decrease the quality of requirements and therefore increase the volatility of the requirements. (Dasanayake et al. 2019)

Pfleeger (2008) stated that to avoid risks caused by the volatility in projects methods to understand and anticipate the changes we see during projects. Next methods to identify reasons for a change introduced by Bano et al. (2012), by McGee et al. (2012) and McGee & Greer (2011).

Changing requirements are one of the main reasons for the failure of projects. The success or failure of a project is largely dependent on how the requirements change is managed. The knowledge of reasons for changes can improve the project team's ability to make better decisions and manage changing requirements in an efficient way. Cause for requirement changes can be divided in two major types: essential and accidental causes. Essential causes are reasons like changes in market or demand, changes in organisational policies or developers increased understanding of the project. Accidental causes are for example vague product vision and strategy or when the business case is not evaluated thoroughly. Not involving key stakeholders, unknown project dependencies and insufficiently specified and analysed requirements can also cause accidental changes. For essential changes focus should be on employing techniques to efficiently deal with the impact of the change. For accidental changes focus should be on utilising techniques and quality processes for avoiding their occurrence. (Bano et al. 2008)

McGee & Greer (2011) identified five domains of change presented in Table 3. Between different domains of the change sources, there are significant differences in cost, value, control, and stakeholder involvement. Usually, changes from the organisation domain are more expensive, have a higher value and more often are opportunities than defects. Organisation related changes usually increase stakeholder involvement and are less easy to control. Changes from vision, specification and solution are often less expensive, causing the involvement of stakeholders to decrease and increase the level of control. The use of this taxonomy will help in understanding the evolution of the solution during the project and as well as providing retrospective opportunities to aid future processes and technique tailoring.

Table 3. Requirements change domains (McGee & Greer 2011)

Change Domain	Description
Market	Differing needs of many customers, government regulations.
Customer Organisation	Changing strategic direction of a single customer, customer organisation considerations, political climate.
Project Vision	Change to the problem to be solved, product direction and priorities, stakeholder involvement, process change.
Requirements Specification	Change to the specification of requirements of the established problem, resolution of ambiguity, inconsistency, increased understanding.
Solution	Change accommodating new technical requirements, design improvement, solution elegance.

The five domains of McGee et al. (2011) can be mapped to terms proposed by Bano et al. (2012). The mapping is presented in Table 4. Based on the phase of the projects lifecycle the classifications can be used for anticipating what factors may cause changes in the requirements of the projects for better planning that will ensure a better success rate for a project. (Jayatilleke & Lai 2018)

Table 4. Change source classification (Jayatilleke & Lai 2018)

Bano et al.'s Classification (2012)	McGee & Greer's Classification (2011)		
Essential	External market	Customer Organisation	
Accidental	Project vision	Requirement specification	Solution

Understanding these types of requirement changes and the cause for them is important. This information can be used in preparing for managing the change in requirements.

4.2 Requirements Change Management Process

RCM process should be applied for all proposed changes. (Sommerville 2007) A proper process for RCM is directly linked to the success of projects. (Ramzan & Ikram 2005) Jayatilleke & Lai (2018) identified that there are two main categories of RCM: formal and semi-formal. There are limitations in both formal methods and semi-formal methods. (Jayatilleke & Lai 2018) Next some proposals of RCM processes are presented.

Leffingwell & Widrig (2000) proposed a five step RCM process:

1. Recognize that change is inevitable, and plan for it
2. Baseline the requirements
3. Establish a single channel to control change
4. Use a change control system to capture changes
5. Manage change hierarchically

The first step is simple. The team working on a project must accept that changes in the requirements are inevitable for the system and even necessary. After the need for changes is accepted the team must create a plan for managing the change in the project. (Leffingwell & Widrig 2000)

When the original project scope is defined the baseline of the requirements should be saved. When the original requirements are saved it gives the team the ability to compare the new requirements that occur during the project to the existing baseline of the scope. (Leffingwell & Widrig 2000)

It is important that every single change goes through a single channel. In this channel change's impact on the system is analysed and the official decision, if the change is going to be implemented in system or not, is made. In small projects, this channel can be a

project champion or a manager. In a larger project this channel should be a change control board which should consist of a few people that would be together in the responsibility of the decisions regarding the changes. (Leffingwell & Widrig 2000)

During a project requests for changes tend to be proposed from various channels. Request can be requested from example from marketing, testers, end-users, or developers. Depending on the source of the request these changes have different probabilities in finding their way naturally into the system. To create structure all requests for changes should be stored in the change request system. The request stored in the change request system can then be evaluated by the authorities in charge of accepting the changes. (Leffingwell & Widrig 2000)

The fact that many people are interested in requesting changes is not a bad thing. Usually, all these requests would be beneficial for at least someone. But if the changes are not managed a disaster can occur. A change to one requirement can have a serious effect on other related requirements or other subsystems. To control the changes the requirement changes should be carried out in a top-down hierarchical fashion. (Leffingwell & Widrig 2000)

El Emam et al. (1997) proposed a four-step RCM process:

1. Initial issue evaluation
2. Preliminary analysis
3. Detailed change analysis
4. Implementation

In the first step, the change request is validated and entered into a database. If the change request answers a problem that is within the scope of the project a change proposal is created. (El Emam et al. 1997)

In preliminary analysis, a conceptual solution for the problem is created. Then this plan is presented to the change control board. If the plan is approved by the board, then a more detailed carry-out plan can be created. (El Emam et al. 1997)

When the preliminary analysis is approved and the carry-out plan is ready a detailed change analysis is performed. In this stage impacts of the changes are evaluated, and all necessary changes are identified. (El Emam et al. 1997)

The last stage of the process is the implementation. When the implementation is released, the process ends with closing the change request. (El Emam et al. 1997)

4.3 Agile Requirements Change Management

Compared to traditional development models, agile development is designed to accept requirements change. Many of the traditional RCM processes are used in agile projects but considering the nature of agile development the RCM processes can be improved to handle changes specifically in agile projects. This RCM process that is specifically aimed at agile projects is referred to as Agile Requirements Change Management (ARCM). (Albuquerque et al. 2020)

The traditional change management models have limitations when it comes to agile development. One of the most fundamental limitations is that many traditional change management methods have low participation of beneficiaries of the change and beneficiary engagement is low on the models. In agile change management main characteristics is that people and users should be at the centre of the change management. In agile development models where users are in the centre are necessary to be utilised. (Le Grand & Deneckere 2019)

Shehzadi et al. (2019) proposed a framework for ARCM presented in Figure 13. Previous RCM models have not included ways to notify stakeholders that change request is implemented. Also, previous models have not included analysis of the risk of an unimplemented change request. (Shehzadi et al. 2019) Next this proposed model is introduced.

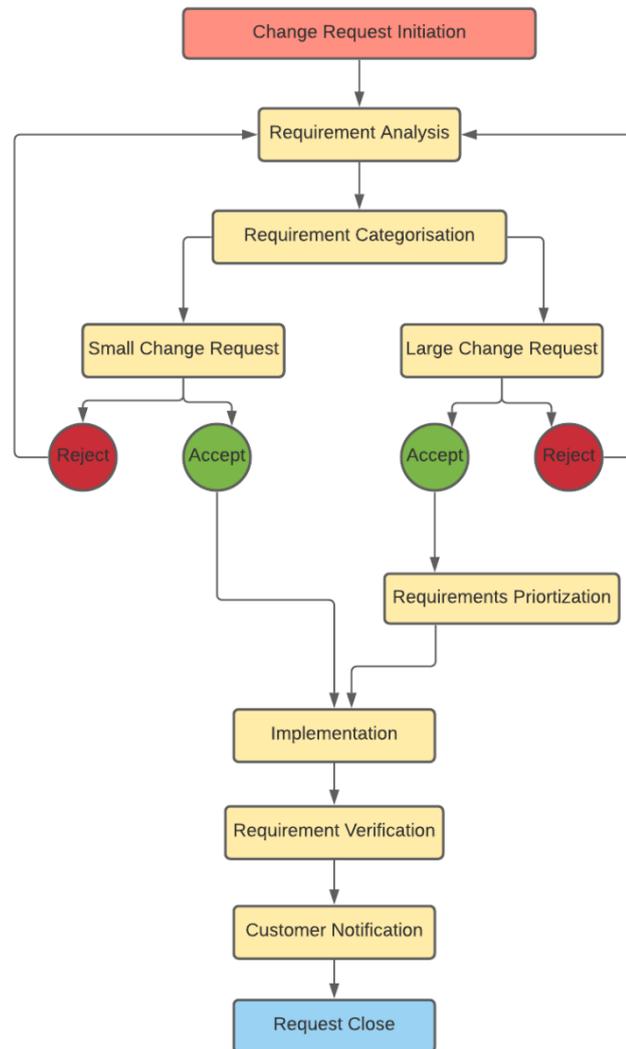


Figure 13. ACRM Framework (Adapted from Shehzadi et al. 2019)

In the change request initiation phase any stakeholder can submit a change request. This submitted request contains information on who did the request and what is the reason behind this change. This submitted request starts the RCM process. (Shehzadi et al. 2019)

In the change request analysis phase, the request is evaluated by the change control board. The change control board will analyse the request and need for the change. (Shehzadi et al. 2019)

The requirement categorization phase addresses the fact that not every change request has a need for the same time used for implementation and complexity level. Some change requests are small requirements while some requests might be the size of a project.

The requests can be divided into two categories: small change requests and large change requests. Small change requests do not need to go through the backlog and those can be implemented straight away if accepted. Large change requests need more planning and analysis so those will need to go through requirements prioritization. (Shehzadi et al. 2019)

After categorisation, the requirements are evaluated. In requirement evaluation, change control board evaluates requested change that is either feasible to implement or must be rejected. The result from the evaluation phase can be either an accepted request or a rejected request. (Shehzadi et al. 2019)

For accepted requests there are differences between small and large change requests. For small requests the changes can be implemented after the acceptance of the request. For larger requests change control board will prioritize the requirements. In prioritization is decided if the change should be implemented in the current release or should be added to the product backlog for implementation in later sprint. (Shehzadi et al. 2019)

Rejected change requests are either sent back to the requirement analysis phase or it can be sent to the closing phase. If request is sent back to the analysis phase the analysis is done to improve the feasibility of the change request. (Shehzadi et al. 2019)

In the implementation phase approved requirements are implemented. The nature of the implementation phase depends upon the type of the change request. For small changes the implementation time is quick, and complexity is small. For larger changes, the implementation phase can take longer and can be more complex. (Shehzadi et al. 2019)

In the requirement verification phase the implemented requirements are verified. In this step it is ensured that implemented changes meet the requirements of the change request. (Shehzadi et al. 2019)

After the successful verification stakeholders are notified about the changes. It is important for the satisfaction of the stakeholders that they can verify the changes implemented meet their expectations. After the notification stage the change request is closed. (Shehzadi et al. 2019)

5 Research Design

This chapter starts the empirical research of this study. Firstly, research approach and methodology are presented. Then semi-structured interview as a data collection method is explained. The chapter continues with a presentation of interview design and data collection.

5.1 Research Approach and Methodology

Semi-structured interviews are the most used format of interviews in qualitative research and can be conducted with individual interviews or with group interviews. Most commonly interviews take time from 30 minutes to a couple of hours. Semi-structured interviews have been proved to be a flexible and efficient data collection method. (DiCicco-Bloom & Crabtree 2006) Qualitative research investigates answers to questions “how” and “why” of the phenomenon in the context in which it is situated (Baxter & Jack 2008). Agile development and RCM in EPM development are complex phenomena that do not have one solution. The research aims to find patterns that explain how these development methods and RCM methods can be used in the area of EPM development. Qualitative methods help to collect data on the topic in-depth, which is beneficial in meeting the objectives of the thesis.

For the semi-structured interviews set of themes and questions were formed before the interviews. In semi-structured interviews there is also a need for improvisation and the researcher is the interviewer. (Myers & Newman 2007) Semi-structured interviews suit especially well for studies related to management and organizational issues. Semi-structured interviews can bring valuable results and help the researcher to understand how the interviewees experience the research topic. It is important to plan the interview script well before the interviews as a well-planned interview can provide a rich set of data. (Qu & Dumay 2011)

One of the challenges of qualitative research is ensuring its scientific nature, quality, and trustworthiness. Qualitative research can be classically evaluated by its reliability and

validity. Reliability can be evaluated by investigating the degree of consistency in research in the sense that another researcher could replicate the research and come up with similar results. Validity is evaluated on how accurately the research presents the phenomenon investigated. (Erikson & Kovalainen 2008) In this research, the reliability is taken into concern by creating a clear script of interviews that can be replicated easily and the interview situation is clearly described.

5.2 Interview Design and Data Collection

The semi-structured interviews were targeted towards Case company's interviews that work with implementing EPM systems in various fields. A shortlist of interviewee candidates to contact was created in collaboration with the case company's Head of Enablement. People were selected with a target to get interviewees with different backgrounds and different levels of experience of EMP system development. These persons selected were contacted with a predefined cover letters via email suggesting an interview about the subject. In total 7 interviews were held during October of 2021.

For a systematic approach to gather data from the interviews a predefined set of questions were formed. Literature review and research questions were used as the base where the interview questions were formed. The interviews were based on the 14 questions that can be found in Appendix 1.

6 Enterprise Performance Management System Development in Practise

This chapter presents how EPM system development is executed in practice. This is measured using semi-structured interviews. The chapter presents how the interview is designed and executed. After this, the results of the interviews are presented and analysed. From the base of interview results, agile development practises in EPM system development are evaluated. Also, change management practises in EPM system development are discussed. In the chapter main stages of EPM system development are determined and a framework for EPM system development is suggested.

6.1 Case Company Background

The case company of this study has been founded in 2008 in Belfast, Ireland. In the early years of the case company's focus was on creating EPM solutions for various clients utilising the IBM Cognos toolset. In 2011 case company made the decision that has been mainly affecting how its operations look today. Case company started implementing EPM solutions with the Anaplan platform as one of the first Anaplan partners in the UK. Since then, the case company has been involved in implementations utilising the Anaplan platform for creating EPM solutions for some of the world's largest companies.

The case company has delivered over 400 successful Anaplan projects for over 250 customers. The case company has been in forefront of Anaplan technology and is one of the most valued partners for Anaplan implementations in Europe, Middle East and Africa region.

The case company operates in three different regions presented in Figure 14. The biggest region by headcount is UK & Ireland conducting 79% of the company's headcount. The UK & Ireland regions biggest office is located in London. DACH region operates in German-speaking Europe and conducts 14% of the company's headcount. DACH regions only physical office is located in Dusseldorf. The Nordic region is the newest region of the

company with the first employees hired in March 2021. Nordic region conducts currently 8% of the company's headcount and the physical office is located in Stockholm.

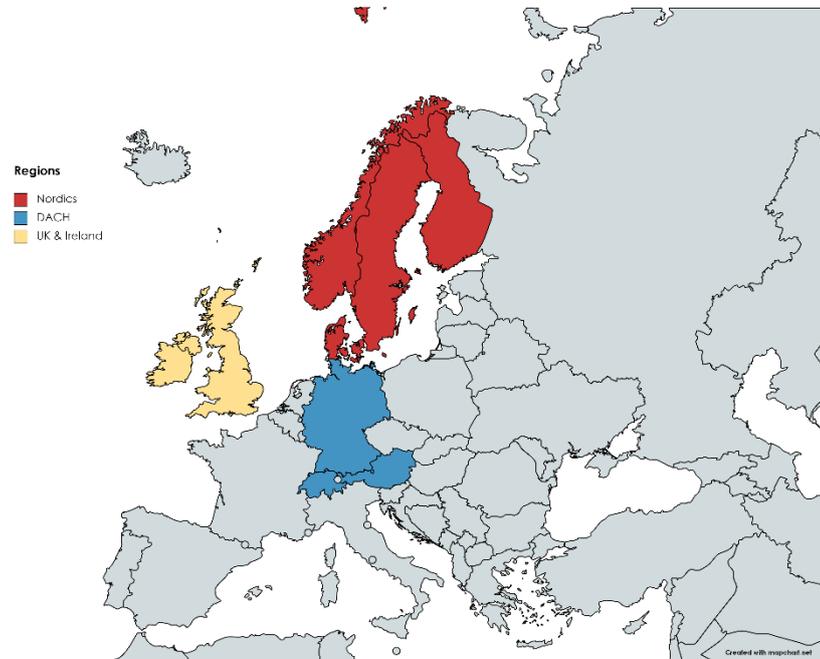


Figure 14. Case company regions

The case company has five different departments with different responsibilities presented in Figure 15. The customer Success department is responsible for EPM implementations that the company provides as a service for clients. The finance department is currently formed just by a chief financial officer and is responsible for the financials and accounting of the company. The founders department is formed by the chief executive officer and strategy officer who represent the founders of the company on its daily operations. Enablement & people operations department is responsible for human resource management of the company and, also taking care of the intellectual skills of company's employees by providing, for example, internal courses on different topics. Sales & marketing is the second biggest department after customer success department. Sales & marketing are responsible for generating new revenues for the company. The marketing part of the department focuses on raising brand awareness and generating leads for the salespeople through different channels. Sales is responsible for delivering demos and

negotiating with possible clients and creating offers for client candidates that suit clients' needs.



Figure 15. Case company departments

The case company can be described as a knowledge intensive firm (KIF). For KIFs there are three distinctive characteristics – knowledge intensity, low capital intensity and professionalized workforce. In KIF key competition resources are organisations knowledge and experience. (Von Nordenflycht 2010) Usually, KIFs operate in the service industry as in the operations of KIF customer demands is fulfilled with knowledge of the employees who have experience in solving customers problems (Lovendahl & Revang 1998, 1999). KIF offers knowledge-based products and professional knowledge on the market. These activities are based on employees' intellectual skills rather than natural resources or physical activities. (Alvesson, 2004)

For KIFs as the case company employees are in an important role in organisations performance. Case company's headcount development by region is presented in Figure 16. From 2016 to 2021 October headcount has grown from 12 to 65. The growth has been organic, and no company acquisitions have been performed during the time period.

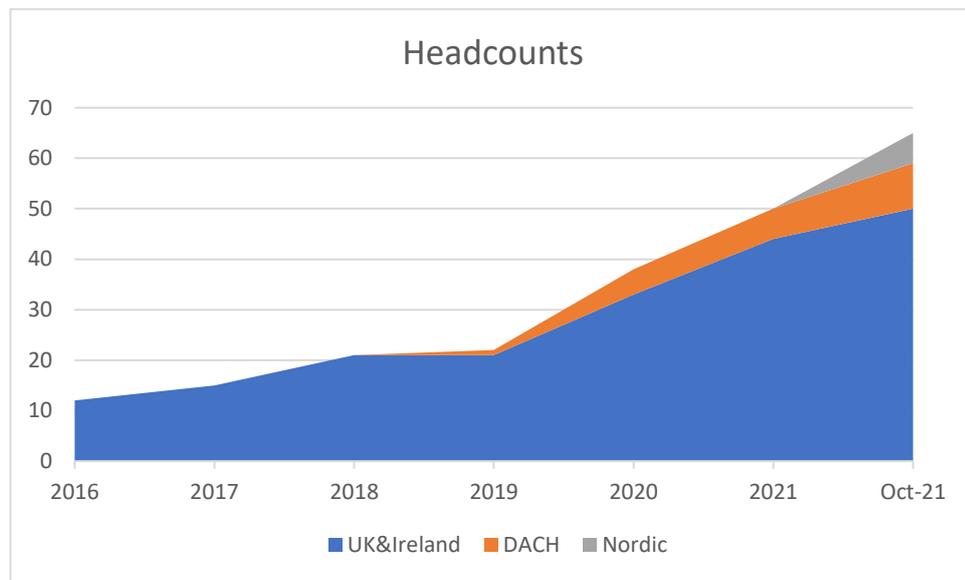


Figure 16. Case company headcounts

The headcount of the case company has grown quickly especially since the beginning of 2019. In these times when several new joiners are starting in the company, the case company has decided to focus on clear and functional processes for the EPM development to ensure great quality of deliveries implemented.

6.2 Interviewee Backgrounds

All the interviewees were employees of the case company. In total seven individuals from the company's different regions with different roles were interviewed. The interviewee's regions and roles are presented in Figure 17.

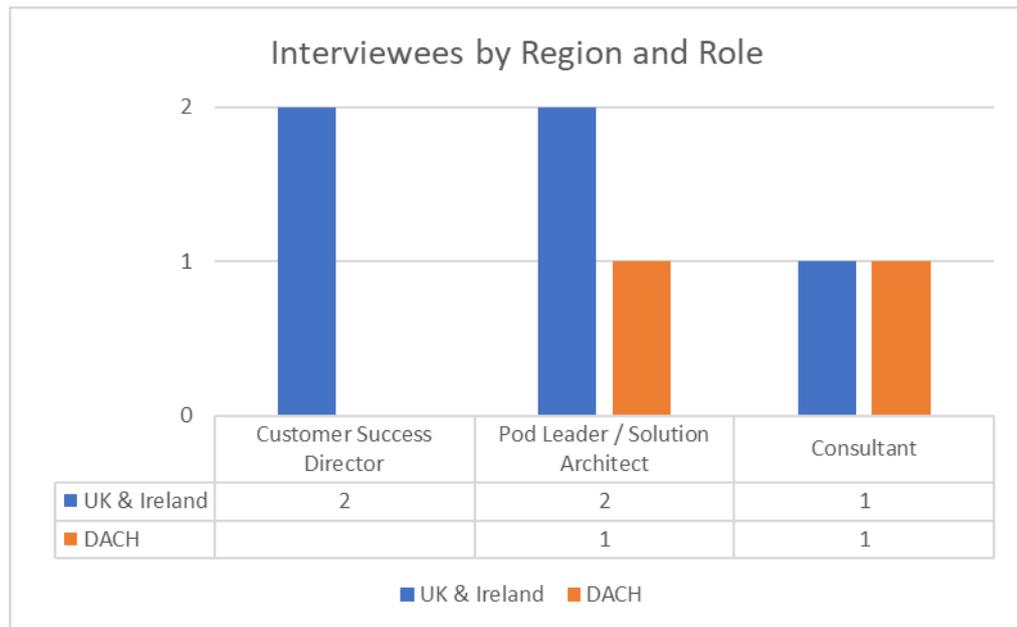


Figure 17. Interviewees by region and role

Interviewees were working in roles of Customer Success Director (CSD), Pod Leader / Solution Architect, and consultant in the case company. In the case company, there is a total of three CSDs. CSDs answer to the head of customer success and are responsible for the success of projects that case company delivers to its clients and for resourcing solution architect and consultant resources of the customer success department. Pod leaders and solution architects are senior members of the customer success department. Pod leaders have their own team of customer success consultants that they act as a manager for. Solution architects have a high responsibility in individual projects success as they are responsible for the design of projects EPM solutions and to take care that best practices of the development process are utilised. Often pod leader and solution architect roles are combined and the same person works as a manager for their own team and then as a solution architect in delivery projects. Consultants work as individual professionals in the company and work in EPM solution delivery projects as model builders under the guidance of the projects solution architect.

6.3 Main Stages of Enterprise Performance Management System Development

In the seven interviews that were held for this study, all the interviewees recognised the iterative nature of EPM systems development. Usually, the first cycle of EPM development aims at creating a minimum viable product (MVP). After working MVP created in the first cycle, the EPM system is often enhanced or expanded utilising the same development stages as in the first cycle. Before jumping into the first cycle of EPM development organisation starting to use EPM system needs to learn about different possible platforms and solutions for the EPM system. This initial stage before starting with the development cycle differs the first EPM project from later projects that follow quite strictly stages of the EPM development cycle presented in Figure 18. Stages of the initial project are presented in Figure 17. The next stages of the initial EPM project and the EPM development cycle are presented.

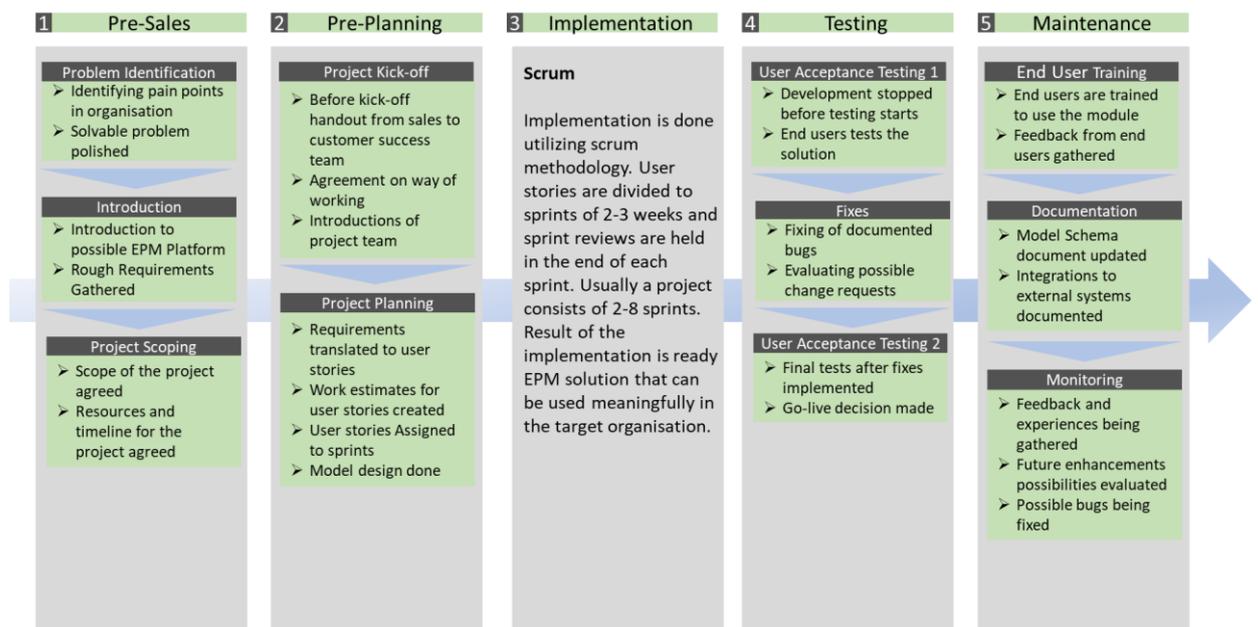


Figure 18. Initial EPM development project stages

Based on the interviews there are a couple of different ways how an organisation may end up starting an initial EPM project. An organisation might identify a problem within their

performance management, for example lack of visibility on the performance of individual units and their effect on the total performance of the organisation. After identifying the problem, they can find EPM systems as a solution to that. This can be the starting point for an EPM project. Another possible trigger for a start of an EPM project is more external. There are multiple different platforms designed for EPM systems and many consulting companies offering consultation for the implementation of EPM systems. Both these platform providers and consulting companies are active in selling either the EPM platform and or consulting services for EPM implementation projects. The sales process of these companies may work as triggers for a start of an EPM project in an organisation. The next stages of this initial EPM solution implementation project is presented.

Pre-Sales

Interviewee's used the term pre-sales for the initial stage of the project. The term refers to that in this stage there is no contract of implementation of the EPM solution between the case company and the possible client organisation. The most important goal of this stage is to identify the problem that the EPM system aims to solve. Also, the platform that is planned to be utilised in the EPM systems implementation is selected. In the pre-sales stage also different examples of EPM systems are demonstrated to the possible client to raise target organisations understanding of the possible platform and in EPM systems in general. To deliver meaningful demos and materials for the target organisation also the initial requirements are gathered on a high level. When the initial requirements are gathered the final project scope can be agreed upon. In the pre-sales stage also the resources and timeline of the project are agreed upon.

The pre-sales stage is typically executed only when the target organisation is planning to create their first EPM system, are changing the utilised platform for the EPM solution or are planning on utilising a new company to provide consultation on their EPM implementation. After the pre-sales stage, the initial project follows the same stages as the normal EPM development cycles (Figure 18) stages.

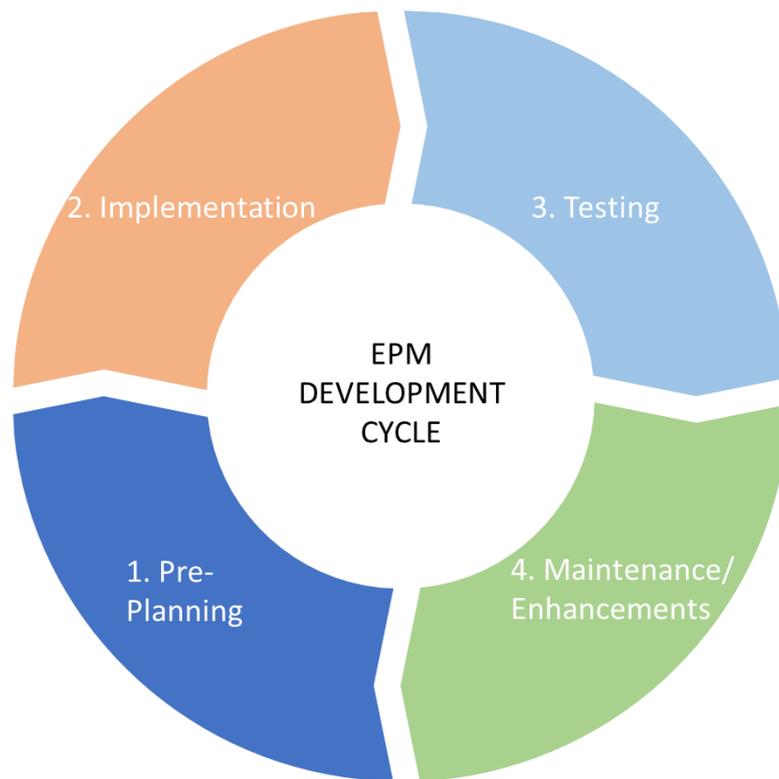


Figure 19. EPM development Cycle

Pre-Planning

The first stage of the EPM development cycle and the second stage of the initial EPM project is pre-planning. When the initial project is moved from the pre-sales stage to the pre-planning stage the project is handed out from the sales to the customer success team. This can be seen as the start for the delivery part of the project.

The first step of pre-planning is the kick-off of the project. In kick-off, common ways of working in the project are agreed and the project team is introduced to each other. Common ways of working include for example agreeing on communications channels and committing to selected change management processes and development methodologies.

Based on the interview's pre-planning stage was seen as really important for the overall success of the project. Many interviewees mentioned that if the pre-planning stage was not executed according to instructions for the stage the mistakes were difficult to fix in later stages of the project.

Implementation

Implementation is the second stage of the EPM development cycle and the third stage of the initial EPM project. In the implementation stage requirements gathered in pre-sales and pre-planning stages are converted into a working EPM system on the selected platform. Implementation is done utilizing Scrum methodology.

Usually, the implementation stage consists of two to eight sprints that are usually two to three weeks long. During a sprint, the project team works with user stories planned to be implemented during the sprint.

Progress of the work and possible problems or change requirements are followed in daily Scrum meetings that usually take place during the first hours of a working day. In a daily Scrum meeting project team members tell what they have been doing since the last daily meeting, what they are planning to do before the next daily meeting and if there is something blocking their work. These meetings form the basis for the communication for the project team and their work.

At the end of each sprint, a sprint review meeting is held. In the sprint review meeting the work done during the sprint is described and newly developed functionality is demonstrated. In sprint review meetings stakeholders agree about the quality of developed functionality and can raise possible change requirements. At the end of sprint review, user stories selected for the next sprint are discussed and agreed upon if any changes to the initial plan are needed.

When all sprints are completed and the EPM system is ready for use often an all-sprint review is held. In this all-sprint review, the whole system is demonstrated end to end to stakeholders and agreed that it meets the scope that was originally agreed for the project. In all sprint reviews also possible future developments and enhancements are discussed.

Testing

The fourth stage of the initial EPM project and the third stage of the EPM development cycle is testing. The testing stage focuses on confirming the usability of the developed EPM system. In the testing stage, there are two types of activities – testing and fixing.

Usually, two steps of testing and one step of fixing is executed but if needed there can be done a bigger number of each stage.

In the testing steps, dedicated end users are first trained to use the developed EPM system and after that, they will be following pre-written test scripts. Test scripts describe activities that users should be able to execute in the system and testers validate that they can perform these activities. Each test script is then marked if the test has been successful or failed and on failed one's reason for failure is written down.

After the bugs in the model are identified on the testing step developers can fix found bugs on the fixing step. It's important that testing has been ended before fixes take place as a moving target should never be tested. After the found bugs are fixed a new testing step can take place.

When a model meets pre-defined exit criteria a go-live, decision can be done. On a go-live decision project team and shareholders agree that the model is production-ready and can be published for production use. When the decision is done a production version of the EPM system can be published.

Maintenance/Enhancements

The final stage of the initial EPM project and EPM development cycle is maintenance. In this stage, the EPM system is in regular use and end-users are trained to use the system, documentation of the system is updated, and the system is being monitored.

In this stage, we can clearly see the iterative nature of EPM systems development. In the maintenance stage end users and product owners start to notice parts of the system that could be improved and have ideas how the system could be enhanced. When there is enough of these improvement and enhancement ideas have been gathered it's time to start planning for the next cycle of development where these ideas can be turned into working functionalities.

6.4 Agile Development Practises in Enterprise Performance Management System Development

All of the interviewees recognised the case company's current development process to be mostly agile by nature when compared if it's a more agile or waterfall type process. Still, many interviewees continued discussion about how close to a theoretically perfect agile company's process is. Quite often in the projects most of the requirements are firstly in the pre-sales phase and later refined to user stories on the pre-planning phase of the project. The user stories are allowed to change during the project but quite often quite limitedly as there has been set up contract between client organisation and case company what is in the scope of the project and how much resources are allocated to the project. With changes, it's important to evaluate if it fits the scope of the project and doesn't risk successfulness of the project with available resources.

All interviewees recognised that the benefits of agile are bigger than the challenges of utilising agile in an EPM project. The most mentioned benefits of utilising agile in EPM projects are presented in Figure 20. Continuous feedback and flexibility of the approach were mentioned most in the interviews. From continuous feedback respondents were saying that it is important that they get continuous feedback from the client about to solution to steer the end product to a way that the client is satisfied with. From the flexibility it was mentioned that Anaplan as a tool is very flexible for changes so committing to development methodology which allows utilisation of that flexibility is important. Also, it was mentioned that as the clients understanding raises during the project they might realise new possibilities how the platform could be utilised in value-creating way. In these situations, the flexibility of agile and the platform allows the project team also to work on these functionalities realised during later stages of the project. Engaging the client was noticed as a benefit by a couple of respondents. They said that compared to their experiences on waterfall development and agile development the client is getting more engaged in the agile development and that raises possibilities of success of the project.

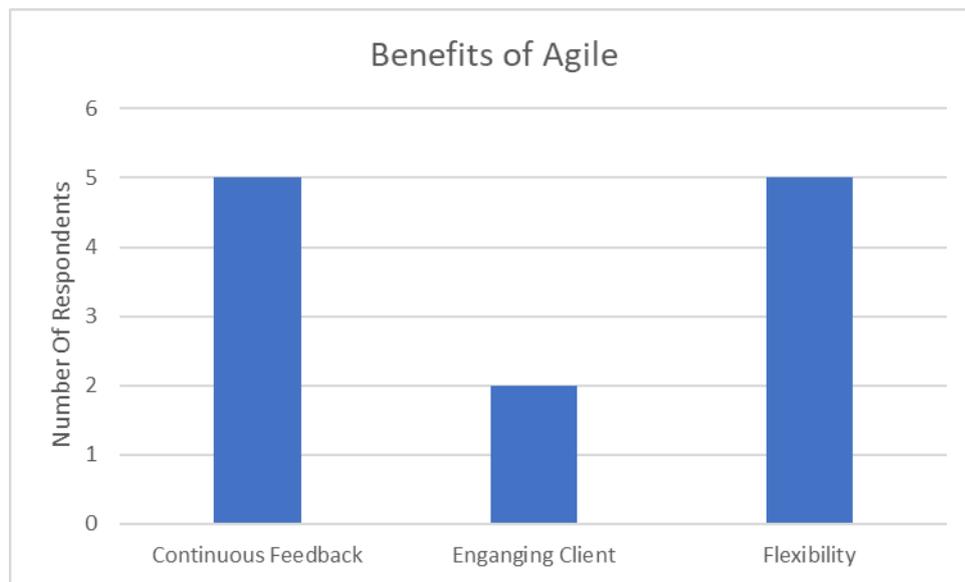


Figure 20. Benefits of agile

From the challenges, governance-related problems were mentioned most often in the interviews. With governance, the problems were usually about having strict agreements on what consultancy service provided should deliver during the project for the client and combining these agreements with flexible agile methodology.

Also, problems related to communication, undefined requirements and customers not being ready for agile were mentioned. All these three problems can be seen as being tied together. Agile development can be for some clients' new methodology, and they might be used to waterfall development. Agile development requires effective communications that clients might not understand. Also, agile's flexibility might be misunderstood and this can cause undefined requirements in the early stages of a project as client expects that they can do changes to requirements when they want without consequences. These problems can be seen to be related to a lack of understanding of agile methodology from the client's side.

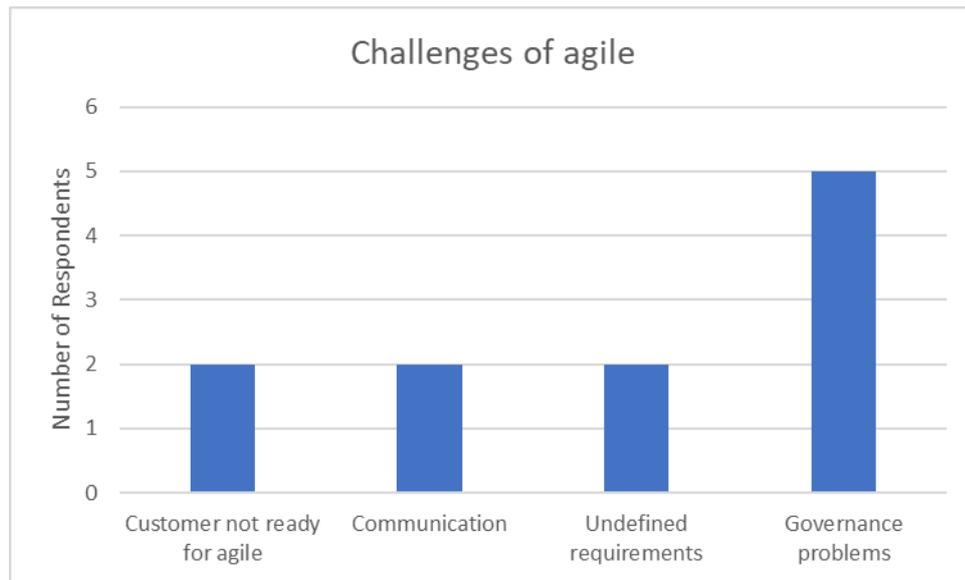


Figure 21. Challenges of agile in EPM development

Both benefits and challenges were recognised from utilising agile in the projects. Still, all of the respondents agreed that agile methodology helps ensure successful EPM implementations. From the challenges, the most mentioned governance problem is related to the environment of the case company as the biggest problem with governance was combining strict contract agreements and flexibility of agile. Also, many of the challenges were related to utilising agile methodology with clients that are not familiar with agile methodology beforehand.

6.5 Change Management Practises in Enterprise Performance Management System Development

In the interviews many of the respondents highlighted the importance of the RCM practises when utilising agile methodology in EPM development and especially when providing consultancy services. When providing consultancy services, it's important that causes, why the end product differ from the original definitions, are documented in detail to avoid challenging situations at the end of a project. In the interviews certain best practises, challenges and development areas for RCM were recognised. In this subchapter, these best

practices, challenges and development areas are discussed and in the end proposal for the RCM process is presented.

The best practises mentioned in the interviews are presented in Figure 22. In the interviews, the most mentioned best practice was that change requests should be documented to ensure a proper audit trail for the changes. Related to this in two interviews was mentioned that the changes should be documented in one specific system so the visibility to all change requests is on a high level. For the change requests also, proper prioritization was seen as an important aspect so the priority of a change request compared to existing requirements can be understood and the project team can implement required functionality in the correct prioritized order. For decision regarding change requests escalation point for larger changes was seen as important. Many of the respondents answered that they might do small changes that require less than one hour of work on an ad-hoc basis but for larger changes, they would need support from higher stakeholders both from the provider and the client side to make decisions regarding prioritisation and other needed actions on the change. This point where the decision is moved to the higher level stakeholders was called escalation point. Also, hierarchical decision making was mentioned in two interviews as for changes it should be the highest stakeholders to decide whether to implement the change or to follow the original requirements.

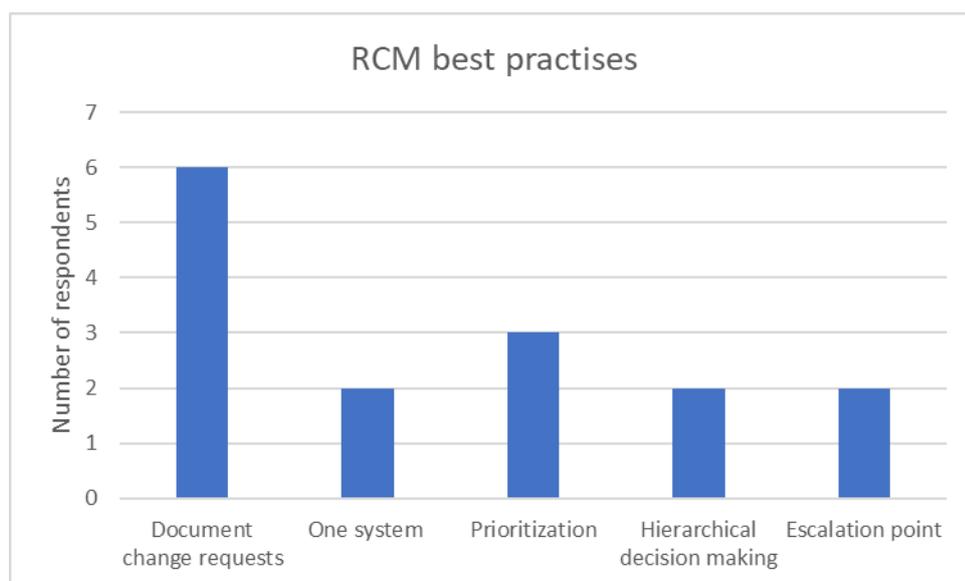


Figure 22. RCM best practises

In the interviews three biggest challenges and development areas were identified. These challenges and development areas are presented in Figure 23.

In many interviews commitment to the RCM process was seen as the biggest challenge. The case company is already utilising a project management system that contains a section for documenting and managing change requests. This system is utilised in most of the projects that the case company delivers. However, many interviewees mentioned that it's often challenging to get clients to document change requests to this system instead of sending them just on an email or as a Microsoft Teams message. Caused by this problem it is often for individual model builders just to implement the changes without documenting it. This easily causes passing the RCM process without utilising them. This challenge is especially important to tackle as even the finest processes won't help if it is not followed properly. Related to this was also the challenge of trying to please everyone. Often in projects different stakeholders have different interests and often it's impossible to please everyone but for a model builder, it's easier to implement a change on request instead of creating a disappointment by saying that something doesn't match the requirements of the project. The third challenge was that often for a non-technical person it is challenging to understand the complexity of a change. Either change might sound very large to a non-technical person but is simple to implement or sounds simple but is technically difficult to implement. This difficulty to see the complexity can cause difficult conversations between technical and non-technical persons in the project.



Figure 23. RCM challenges and development areas

The first development area relates to the biggest challenge of commitment to the process. In order to start following the RCM process first step is to emphasise the importance of documenting and tracking the change requests. Also, some interviewees recommended that additional escalation point could be added as currently usually the project team does decisions related to change requests but sometimes it would be important to involve higher stakeholders in these decisions.

The last development area was brought up in one interview and was then validated by following answers in other interviews. The interviewee mentioned that even though there is a section for RCM in the utilised project management system there is no clystar clear official RCM process followed by the entire company. This was validated by recognising that each interviewee had a little bit different understanding of the current RCM processes in the case company. The interviewee was thinking that an official RCM process that would be followed by the entire company should be established. Also, with a formal process, there would be better possibilities to improve the RCM processes as it would be the same through the entire company and not changing in each project.

Inspired by the lastly mentioned development area a proposal for the RCM process for the case company was created. The proposal was based on the interviews and the literature review. Proposal of the RCM process is presented in Figure 24.

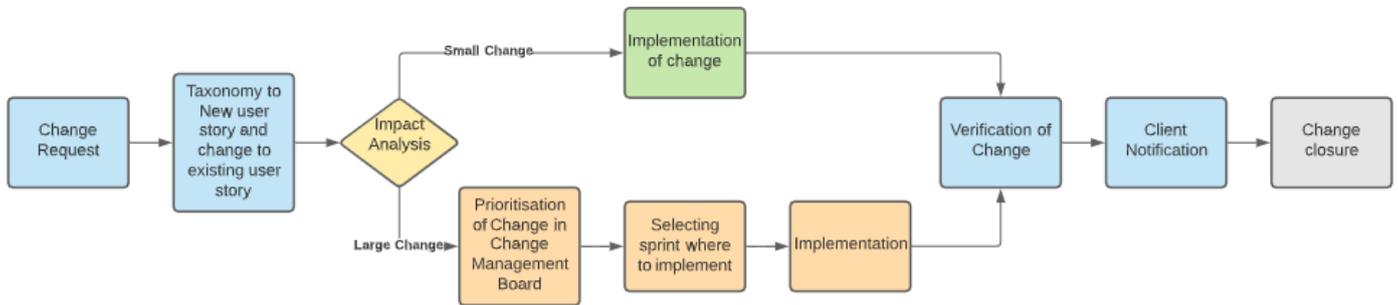


Figure 24. Proposed RCM process

The process starts with an incoming change request that would be documented in detail to the used project management system. Then the request should be taxonomized for clarity either to be a new user story or a change to an existing user story. When a user story is taxonomized solution architect from the provider side and the project owner from the client side can together perform an impact analysis of the change and decide if the request is a small or a larger change. In this stage, it is also possible to decline the change and then the request won't be implemented. If the change is small, it can be implemented during the ongoing sprint. If change is larger then it should be prioritised by a selected change management board that should have also higher stakeholders of the project involved. After prioritisation, the request can be placed on sprint and then be implemented in the selected sprint. After implementation, the changes should be verified by the model builder. When changes are verified the requested can be notified that changes are implemented and ready. After this step, the change request can be closed.

7 Conclusions and Discussions

This thesis consists of two parts. The first part of the thesis is a literature review. The literature review consists of three chapters: Enterprise performance management, Agile Development, Requirements Change Management. The first chapter of the literature review focuses on the topic of EPM and describes an overview of the phenomenon of performance management. After the overview of EPM agile development is explored. Lastly in the literature review practises of RCM are presented. The theory is used to give background for the empirical part where EPM system development processes are evaluated.

The second part of the research is an empirical study where data is collected with qualitative interviews. The study aims to identify the main stages of EPM system development and evaluate how agile development and RCM practises could be used in EPM system development. In chapter six empirical research results are presented.

This final chapter of the thesis includes the summary of the thesis report. After the summary of the report, research questions are answered in limitations of the study. The research questions are answered based on findings from the literature review and the empirical research. Then the chapter continues with a discussion and recommendations for the case company. Finally, suggestion for possible future research is given.

7.1 Answering the Research Questions

This thesis aimed to study the main stages of EPM development, combining agile methodology with EPM development and RCM processes in EPM development. To support these objectives three research questions were formed. Based on the data from the interviews and findings from the literature review these questions are answered below.

Research Question 1: *What are the main stages of EPM system development?*

EPM systems are used for executing the strategy of an organisation through for example planning, scheduling, and budgeting. EPM systems should adjust to the strategy of the organisation using the system. Also, the EPM system should evolve with the underlying organisation. This nature of EPM systems promotes iterative development methods. In Figure 25 main stages of EPM development are presented. To get the most value of an EPM system these stages should be run in an iterative manner.

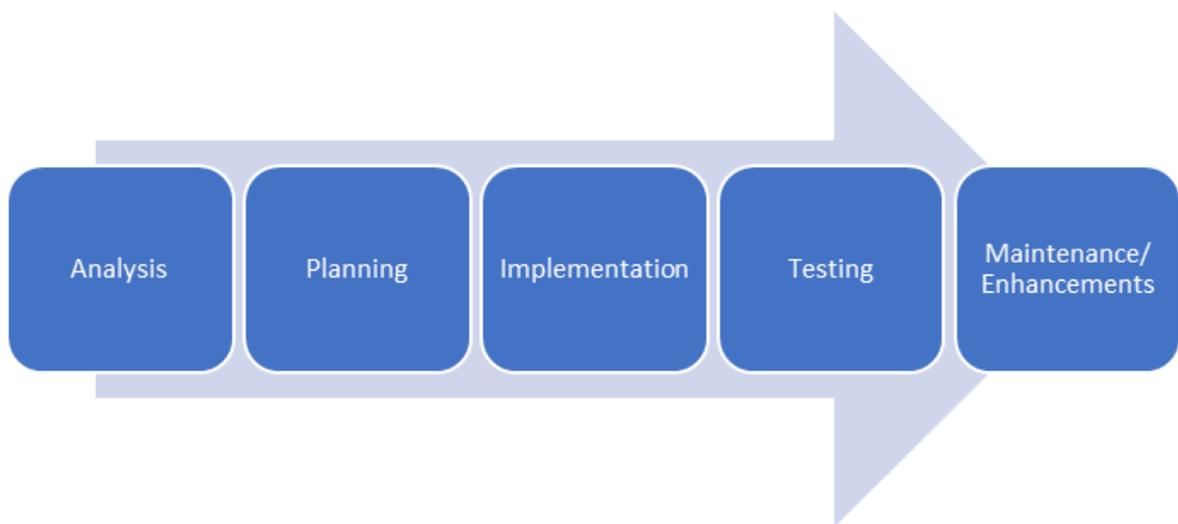


Figure 25. Main stages of EPM development

The first stage of EPM development is analysis. In the analysis stage, the initial problem that the EPM system is developed to help with is identified. After this problem is identified the initial high-level requirements for the project are formed. Also, the platform for the EPM system is selected in the analysis stage and the project team for later stages is agreed.

The second stage of EPM development is planning. In the planning phase, common ways of working in the project are agreed and the project team is introduced to each other. The most important deliverables of the second stage are documentation of detailed requirements, model design schema and the timeline for the project. The analysis stage is one of the most crucial parts for EPM projects success as mistakes made in the gathering detailed requirements or in the model schema are difficult to fix in later stages of an EPM project.

In the implementation stage, the EPM system itself is built. Based on the nature of EPM systems the development should be done utilising agile methodologies to receive continuous feedback from the end-users to help with building a valuable EPM system. The most important deliverable from implementation is the working EPM system that is ready to be used in the target organisation.

The testing stage focuses on confirming the usability and performance of the developed EPM system. The testing stage contains two types of activities – testing and fixing. These two steps should never be run simultaneously but testing should be stopped for the time of fixing and fixing should be finished before retesting is started. When the system meets pre-defined exit criteria a go-live decision, can be made. After the go-live decision the EPM system is published for production use.

In the maintenance & enhancements stage, focus is on running the existing EPM system and making minor improvements. During this last stage of EPM development, improvement and enhancements ideas are gathered from end-users and product owners. When there is a suitable amount of ideas gathered a new iteration of EPM development stages can be started to develop new functionality based on these ideas.

Research Question 2: How agile methodology supports EPM system development?

From the nature of the EPM systems, the evolutionary development approach is suitable for EPM systems development. Agile methodology can be used to support this evolutionary development through its iterative nature. Compared to the waterfall methodology agile provides flexibility. EPM systems should adjust to the strategy and business environment of the organisation utilising the system. In the current fast changing-world, the business environments can change rapidly and flexibility from the system following this environment is needed.

In the interviews, both challenges and benefits from utilising agile methodology in EPM system development were recognised. Still, all the interviewees agreed that the benefits are much bigger than the challenges. Based on this can be concluded that agile development fits EPM system development.

The main benefits of agile recognised in the interviews were flexibility and continuous feedback received from the client. Flexibility makes it possible to adjust the requirements of the project during the implementation if changes are needed for example because of change in the organisations business environment or because of change in understanding of the platform by the stakeholders. Continuous feedback was seen as important in ensuring approval of the developed system through the project.

Challenges were mainly related to the nature of consulting business combined with the nature of agile and utilising agile in project teams that are not used to working with agile methodology. In consultancy business contracts and agreements made can give strict requirements for the developed system and changes to the contracts can be difficult. These limitations combined with the flexibility of agile cause a need for strong governance to ensure that agreed requirements are delivered regardless of the flexibility of agile. This also limits receiving the biggest benefits of agile methodology. Other recognised challenges were related to communications and undefined requirements.

From these challenges recognised can be seen that those are not related to the nature of EPM and the nature of agile but the underlying environment where the EPM systems are developed. Overall agile methodology seems to suit EPM system development well and the recognised challenges are possible to overcome by ensuring that also the project scope is flexible enough and the whole project team has suitable knowledge of agile methodology.

Research Question 3: What are the best practises for requirement change management in EPM system development?

When utilizing the agile methodology that accepts changes and gives flexibility in projects it is important to also plan on how the change in requirements is handled. For this cause best practices for RCM in EPM system development were gathered in the interviews.

In the interviews, the single most mentioned best practice was documenting the change requests. This can be also seen as a base for having a formal RCM process. The documentation of a change request can start the RCM process for an individual change

request. Well documented changes are also important in consultancy business as those ensure the possibility to audit why ready EPM system differs from the initially set requirements. Relating to documentation it was also mentioned that the changes should be documented to one system and not multiple ones. This documentation to one system ensures that all documented requests have the same visibility for all stakeholders.

Also, prioritization of change requests and hierarchical decision making was seen important. Prioritization and hierarchical decision making can be seen to be tied together. For larger change requests higher stakeholders should either approve or decline the request and then create prioritization for the approved requests. From these decisions made by higher stakeholders, the project teams know which change request they should implement and in what prioritized order.

Overall formal change management process that would be followed was seen as important. The importance was related both to the nature of EPM system development and the nature of consultancy. For EPM development often higher stakeholders do not take part in daily development activities but should be involved in decisions regarding larger changes in requirements of a project. For all the best practices recognized utilizing a formal RCM process is important to ensure the success of an EPM project.

7.2 Discussions and Recommendations for Case Company

This thesis studied EPM system development, agile methodology and best practices for RCM in EPM system development. The current state of these topics in the case company was analysed with qualitative interviews. With the result of the interviews, it was possible to form the main stages of EPM system development and analyse the benefits and challenges of agile methodology and best practices for RCM.

While the case company is growing rapidly and lots of new employees are joining the company it is important to ensure that company's processes are clear and functional. Especially the utilised development process was seen as an important factor for the success of the projects. Therefore, it would be important to include clear documentation and training of the current processes to the onboarding phase of new employees. Withing the current process the first two stages were seen as the most critical ones for the overall

success of the project. In some of the interviews, a pain point in projects was identified to be the handover from the sales department to the customer success department between the pre-sales and the pre-planning stages. For this handover a formal process could be developed to ensure a smooth experience for client's personnel who are involved in both stages.

Agile methodology was clearly recognised as a supporting methodology for EPM development. From the challenges recognised with agile methodology, many were related to people not really understanding the agile methodology's principles. For relieving problems caused by these challenges a focus on ensuring that everyone on projects understands the principles would be important. Also, limitations on utilising agile caused by contracts should be considered how the contracts could be made in a way that would allow project teams to fully achieve the potential of agile methodology.

For the RCM there was most differentiation on individual respondents' visions on the case company's current process. There was a clear voice on that the RCM should be done in a formal way. According to the interviews, there has not been established an official RCM process. An established process would make it possible to analyse different points of the process individually making improvement of the process easier. A proposal for a formal RCM process was presented in Figure 24. This proposal could be used for the base for forming a documented RCM process.

Lastly, the current EPM system development processes in the case company were not criticized in the interviews. This indicates that the company can continue utilising the current EPM system development process trustfully.

7.3 Future Research

This study researched the main stages of EPM system development, how agile methodology supports EPM system development and the best practices of RCM on EPM system development projects. The qualitative interviews were conducted in an environment where interviewees implement EPM system development projects as consultants.

Especially for the support of agile methodology for EPM system development the contracts and agreements limited utilizing all benefits of agile methodology. Therefore, future research possibilities would be around conducting research of agile development and EPM development in an in-house environment where different contracts and agreements wouldn't limit utilising the flexibility given by agile methodology.

In future research, it would be also interesting to study how different EPM system platforms affect the development process. In this study, all interviewees had the experience of implementing EPM systems utilising Anaplan and some of them had experience with the IBM Cognos TM1 platform. Besides these two platforms, there are other EPM platform providers also. It would be good to review how different platforms affect the development processes.

The case company of this study is a young and relatively small consulting company that has been built around agile methodology since the beginning. Also, in the consulting the Anaplan platform is utilised. To add on, the Anaplan platform is built to be developed using agile methodology. This environment is especially commodious for agile methodology. This can also see as a limitation for the study as in the group of the interviewees the waterfall methodology is not seen even as a possibility. This also limits the usability of the findings for EPM development in all companies and with all platforms. Some of the platforms might not be so favourable for the agile methodology. For this reason, it would be beneficial to research how agile methodology would fit into an organisation that has developed EPM systems with the waterfall methodology and with a different platform.

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Appendix 1: Interview questions

Common:

1. Briefly describe your role and responsibilities in the company?
2. What experience do you have in enterprise performance management?
3. How long have you been working for the case company?
4. Describe your background besides EPM?

Related to the first research question (Main stages of EPM development):

5. How does the EPM development process work in practise from your point of view?
6. Does the current process support successful implementations?
7. Are there stages that should be added to current processes?
8. Are there stages that should be removed or remodified?

Related to the second research question (EPM and agile)

9. Would you describe current process to be more agile or waterfall type development?
10. When are requirements/user stories gathered in a project?
11. Do you think agile approach helps in successful implementations?
12. What do you feel like as biggest problems in agile approach in EPM implementations?

Related to research third research question (Change Management)

13. Have you felt that current requirement change management processes are successful?
14. What are the best practices in your opinion for change management?
15. What should be done better to master the change management processes?