



TAMPEREEN
AMMATTIKORKEAKOULU

PROJECT MANAGEMENT IN SAP EHS FIORI CLOUD DEVELOPMENT

Global Chemical Database Renewal

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ABSTRACT

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Project Management in SAP EHS Fiori Cloud Development

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This thesis was written for a company, which uses SAP ERP EHS (Environment, Health and Security) component globally for storing and maintaining chemical data and documents. A need for renewing the current Chemical Database portal for displaying Material Safety Data Sheets (MSDS) and Work Safety Cards (WSC) was faced since its maintenance ended in December 2016.

The objective of this thesis was to raise questions about managing small projects and the purpose was to provide a framework, a guide for Project Management in small projects. Projects are commonly defined as ‘small’ based on their length, scope, and budget. This thesis covers all the phases of a project lifecycle and reflects them to project management methods such as waterfall, agile and hybrid. The hybrid project method offers the benefits of defining project the same way as in waterfall, but is as flexible and iterative when testing prototype as the agile method. In addition to the project management point of view, this thesis provides an insight of the solution that was built on the new technology, SAP Fiori Cloud platform, and its user experience and architecture.

Since user experience was one of the most important requirements in SAP EHS Fiori Cloud project, research for usability of the old portal was conducted and analyses were taken into consideration in the new solutions’ definition and design phase.

The purpose of the project was to provide a fast, user-friendly, and reliable new solution for searching and displaying chemical documents for the end users working on mills globally. Another purpose was restricting the visibility to chemical documents, with authorizations based on plant and business areas.

SAP EHS Fiori Cloud project was completed with fulfilling most of the requirements with some delays in the schedule and deviation of budget. The end-product, new application for searching chemical documents, was implemented to the production system in January 2018 and in the future its development will continue.

In the future, this thesis can be used as a project management guide and supporting document for building structure to small projects.

Key words: SAP EHS, SAP Fiori, Cloud, Project management, UX

TIIVISTELMÄ

Tampereen ammattikorkeakoulu
Tietojärjestelmäosaaminen, ylempi AMK

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Projektinhallinta SAP EHS Fiori Cloud -kehitystyössä

Opinnäytetyö 45 sivua, joista liitteitä 1 sivua
Lokakuu 2018

Opinnäytetyö toteutettiin yritykseen, joka käyttää toiminnanohjausjärjestelmässään SAP EHS (Environment, Health and Safety) -komponenttia globaalisti kemikaalitietojen ja -dokumenttien ylläpitoa varten. Kemikaalidokumenttien eli käyttöturvatiiedoiteiden ja käyttöturvallisuuskorttien hakua ja katselua varten syntyi tarve uudistaa vanha portaali, jonka ylläpitotuki oli päättynyt vuonna 2016.

Työn tavoitteena oli tuoda esille pienten projektien projektinhallinnan kysymyksiä ja tarkoituksena oli tuottaa pienten projektien hallintaa varten ohjeistus, jonka avulla projektin hallintaa voidaan toteuttaa mahdollisimman tehokkaasti. Yleisesti pienet projektit määritellään niiden pituuden, laajuuden ja budjetin mukaan. Opinnäytetyö kattaa kaikki projektin vaiheet peilaten niitä eri projektimenetelmiin kuten vesiputous-, ketterä ja hybridimalli. Hybridimallissa projektin määrittelyvaihe toteutettiin samalla tavalla kuin vesiputousmallissa, mutta testaus tehtiin iteroivasti kuten ketterässä menetelmässä. Opinnäytetyö tarjoaa myös näkökulman uuteen teknologiaan, SAP Fioriin, sen käyttäjäystävällisyyteen ja arkkitehtuuriin.

Koska yhtenä tärkeimmistä vaatimuksista SAP EHS Fiori -projektissa pidettiin sovelluksen käyttäjäystävällisyyttä, projektin aikana toteutettiin tutkimus käyttäjäkokemuksista nykyisestä portaalista ja tulosten analyysi otettiin huomioon uuden sovelluksen määrittelyssä ja suunnittelussa.

Projektin tarkoituksena oli toteuttaa loppukäyttäjille, eli kemikaaleja tehtailla käsittelevälle henkilöstölle, käyttäjäystävällinen, nopea ja luotettava ratkaisu kemikaalien dokumenttien hakua ja katselua varten. Uuden sovelluksen oli katettava kaikki tarvittavat kie-liversiot, sillä sen tuli olla käytettävissä globaalisti. Tarkoituksena oli myös rajata loppukäyttäjien käyttöoikeuksia dokumenttien näkyvyyteen tehdas- ja liiketoiminta-alueittain.

SAP EHS Fiori Cloud -projekti toteutui lähes määriteltujen tarpeiden mukaisesti jonkin verran aikataulusta ja budjetista poiketen. Projektin lopputuote, uusi kemikaalitietodokumenttisovellus, otettiin käyttöön tammikuussa 2018, ja sen kehitystä jatketaan.

Tätä opinnäytetyötä voidaan tulevaisuudessa käyttää projektinhallintaan sekä sitä tukevana dokumenttina pienissä projekteissa.

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LIST OF ABBREVIATIONS

Agile	Iterative project method that enables change in requirements, adaptive planning, and continual improvement
Deliverable	A produce of every project phase or project's end-product
GCD	Global Chemical Database, used in company for maintaining and storing chemical information
IBM SPSS	Software package used for statistical analysis by IBM
MSDS	Material Safety Data Sheet are chemical documents send by chemical vendors and which are saved in SAP ERP EHS component
PMBOK	Project Management Body of Knowledge, a set of standard terminology and guidelines. Guide to PMBOK 6th Edition was released in 2017 and it is overseen PMI, Project Management Institute
POC	Proof of concept is a realization of certain method or theory in real life. POC is usually small part of actual development
RACI Matrix	RACI is acronym of words responsible, accountable, consult and informed. RACI matrix can be used for ensuring roles and responsibilities in project team.
SAP Cloud Platform	Platform as a service developed by SAP AG for creating new applications such as SAP Fiori
SAP EHS	SAP Environment, Health and Safety comprises multiple component such as Product Safety (EHS-SAF) that contains the functions required to manage hazardous substances (chemicals)

SAP Fiori	SAP Fiori application, a user interface that can be built on existing SAP ERP processes
SSO	Single Sign-on authentication can be used when user is accessed to company intranet
UI	User interface is the space between system and user. Interface is usually aimed to be built as easy to use as possible
UX	User experience is about human and computer interaction and how user feels when he or she is using the system
Waterfall	Sequential design project method that is more rigid than agile method since it does not contain any iterations
WBS	Work Breakdown Structure is hierarchical project model representing activities that need to take place during project
WSC	Work Safety Card is chemical document that is generated in SAP EHS module to provide users the chemical information about certain chemical released on plant and work area

1 INTRODUCTION

This thesis describes the project management in small Fiori application project. It aims to provide a framework for small projects and it was written to provide the best practises, and useful methods for future small projects. This thesis can be used for benchmarking with similar projects. Writer of this thesis worked as a project manager for this project.

In the case of SAP EHS Fiori Cloud project, the purpose was to renew the old Global Chemical Database (GCD) portal. The requirement for renewal was due to that SAP AG had ended the maintenance and didn't support the application from December 2016 onwards.

The GCD Portal was originally developed by TechniData AG, and it was acquired by SAP AG in 2010 (Linke 2010). Global Chemical Database portal is part of SAP ERP's Environment, Health and Safety Product Safety (EHS-SAF) component. Company uses the SAP EHS module globally to gather all chemical data for approximate 7000 chemicals. Company stores over 15000 documents in SAP EHS system.

Chemical documents are used on every mill where chemicals are handled. Material safety data sheets (MSDS) are documents, that contain the information about substance or mixture, its properties, and its risks. It also includes the safe use in industrial, and in professional activities (Finnish Safety and Chemicals Agency 2018).

Chemical documentation is controlled by the REACH regulation (no 1907/2006), which is the European Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals. This regulation was entered into force in 2007. REACH regulations aim is to guarantee the high level of protection and safety for human health, and for environment. (European Commission 2018.)

In the SAP EHS Fiori Cloud project, the requirement to renew the portal was identified as mandatory development, because of the regulations, and the requirement to guarantee the availability of the chemical documents on the mills to all chemical users. When replacing the old GCD portal, the new application, SAP EHS Fiori Cloud, should consider the regulations, global requirements, and environmental aspects in the design. New solution also needed to be easy to use. One of the requirements was also language base since

chemicals are globally used. In the company, SAP EHS Fiori Cloud project was defined as enhancement or as small project due to the company's standard classifications. It was considered rather small, and it didn't have any dependencies to other solutions.

Project was initiated in 2017, as the old portals support had ended in December 2016. Since SAP EHS Fiori Cloud project was considered as a small project in the company, there wasn't feasibility study phase required. Project life cycle contained phases such as planning, initiation, definition, design and prototyping, building, executing, and closing. As a project method, waterfall and agile was mixed and hybrid model was used. In this hybrid model, definition was waterfall-like, but testing was iterative. Hybrid model made it easier to do changes into the technical solution still in testing phase.

In the beginning of the SAP EHS Fiori Cloud project, the interest of usability was raised. It became useful to understand how often current portal is used, what are the search criteria used, and how much can a user interface affect to user experience. For analysing this information, a quantitative research study was conducted for end-users. Quantitative research aims to answer questions what, where, how many and how often. However, it will not provide an answer to question about the reason what lead into certain situation. Study results gave important information about usage of the current portal. This information was used in the project definition phase when defining the functional specification of SAP EHS Fiori Cloud solution.

The requirements were based on definitions documented in the functional specification document. Requirements could be classified into different categories: functional, technical, and security requirements. Also, other aspects such as project schedule, budget, resources, and vendors were planned and documented into Service Now (Snow), which is an IT Service Management (ITSM) tool used widely in the company.

The selection for build partner was based on proof of concept (POC). This became critical selection criteria and it was needed because of complex and somewhat tailored system solution. During the build phase, project team faced technical challenges caused by the complex backend solution and this affected the schedule and budget. However, issues were solved and build phase was finalized with integration testing by application vendor and new solution was distributed to users.

In the project closure, lessons learned was documented, and project reflection was done. In the evaluation of the project, success was measured by the requirements, and the outcome of the project. The project was a success, since mainly all requirements were met, but from project point of view schedule and budget were exceeded.

2 SAP FIORI

SAP Fiori is user interface that was developed by SAP AG to improve the user experience and performance of the business processes. SAP provides a library of over ten thousand readymade Fiori applications in reference library. Addition to readymade applications, applications can also be personalized based on the needs and requirements of company. SAP Fiori runs on top of existing SAP ERP and uses the transactions and processes maintained in the backend system.

2.1 Cloud platform

SAP Cloud Platform is cloud-based service that is provided and hosted by SAP AG. It allows company to use SAP processes with applications that can be used on different kind of devices, on PC's, smart phones, and tablets. When applications are built on cloud platform, there is no need to use SAP GUI for logon since it happens via single sign on (SSO) when user opens application. SSO requires user to log into company internal network. SAP Cloud provides the development for process-based tools, and e.g. Fiori applications for users. Fiori is a concept that defines basic design rules for browser-based applications. (Company info book on Fiori applications and architecture n.d.)

SAP Cloud Platform is described as an open platform, platform as a service (PaaS), which provides customer in-memory capabilities, core platform services, and unique business services for building, and extending personalized, collaborative, mobile-enabled cloud applications. SAP promises customers to use Cloud platform without investing in on-premise infrastructure. (SAP Cloud Platform n.d)

Benefits of cloud platform is that it makes developing easy since development environments can be built very quickly. Developers can also transfer development done in another environment as long as they are built in cloud platform.

2.2 User Experience (UX)

SAP Fiori applications are user-friendly and can be designed freely if SAP ERP basic business logic is followed. SAP EHS Fiori Cloud application was built as browser-based application, which means that it can run basically on any device that has a web browser. Since Fiori's are hosted on SAP Cloud platform, they are easy to develop, distribute and consume. SAP offers several thousands of ready to use applications, but it is also possible to tailor an application from the start as it was done with SAP EHS Fiori Cloud application. (Company info book on Fiori applications and architecture n.d.)

Figure 1 presents how SAP Fiori considers people, business, and technology (SAP Cloud Platform n.d.).

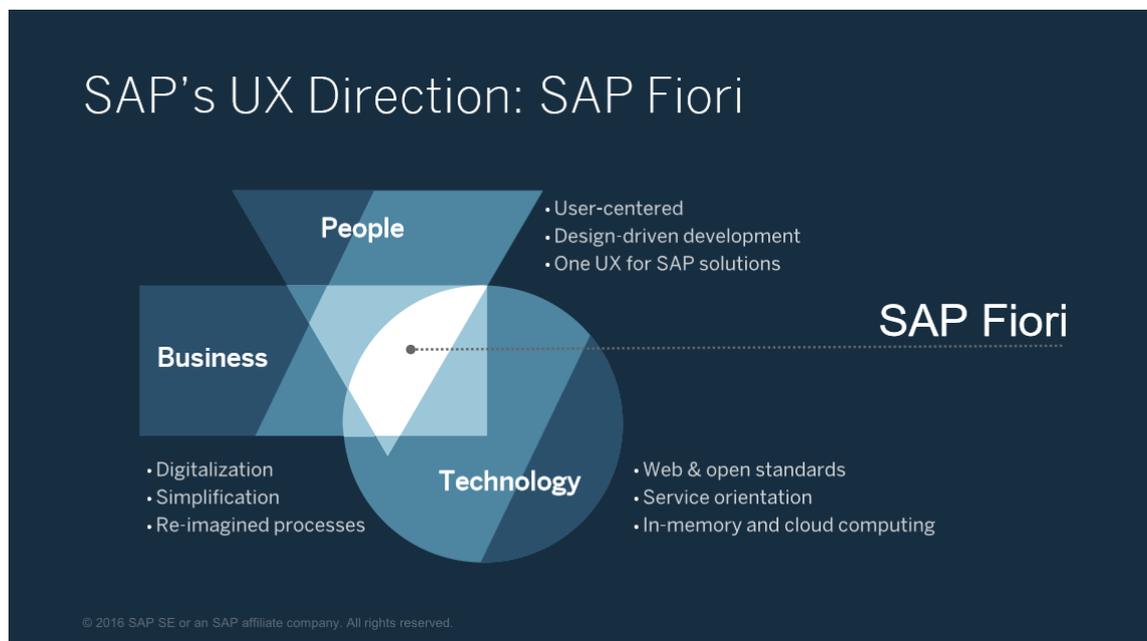


Figure 1. SAP Fiori is focused on user experience (UX) (SAP User Experience Strategy 2016).

2.3 SAP EHS Fiori Cloud Architecture

SAP EHS Fiori Cloud landscape was designed based on other applications (figure 2) built previously in the company. The SAP cloud contains the SAP EHS Fiori development and code repository and is accessible from e.g. laptop. Connection to backend system happens via cloud connector DMZ demilitarized zone and company's intranet.

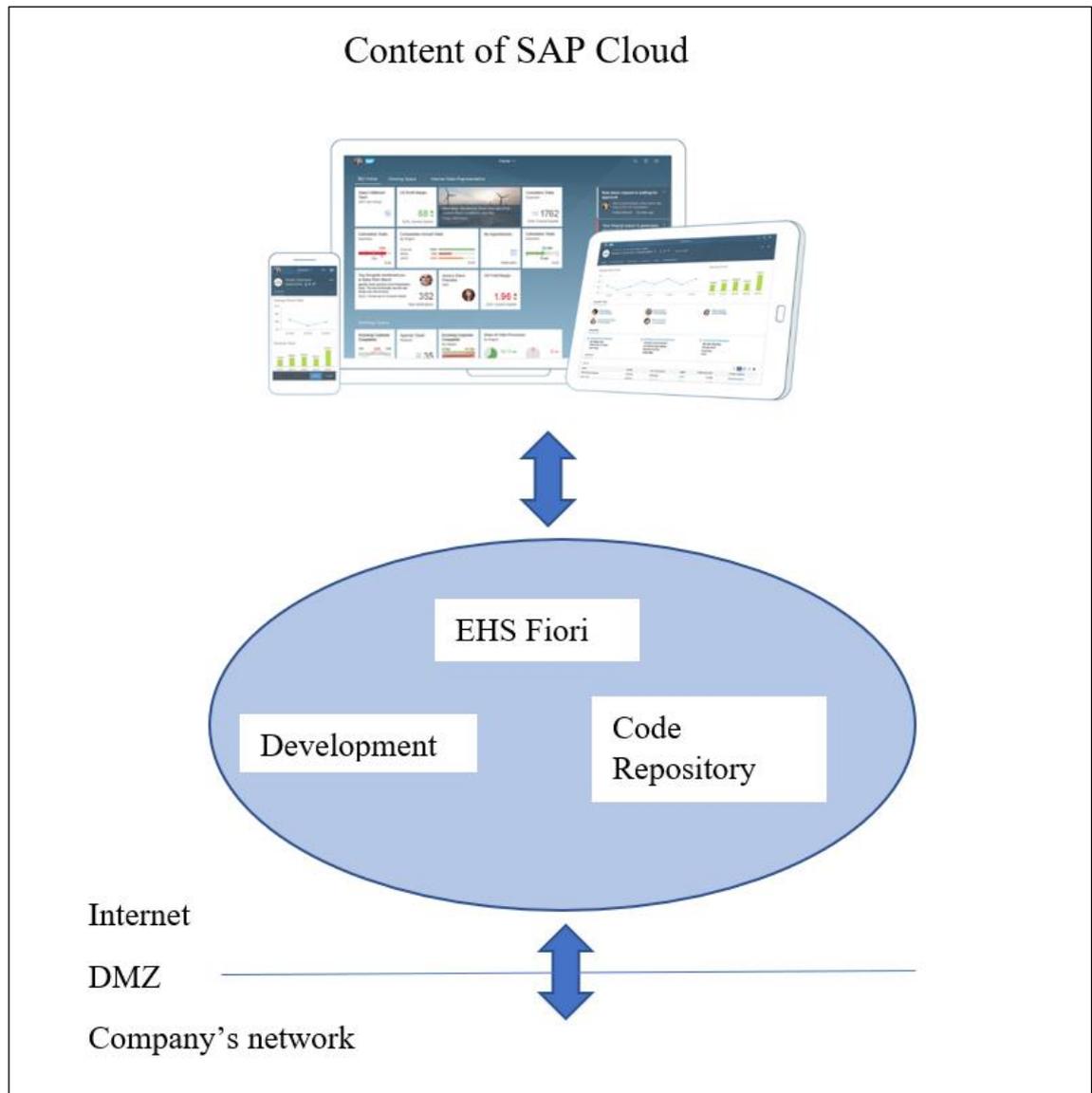


Figure 2. SAP EHS Fiori Cloud landscape (Fiori Design Guidelines 2018, modified).

3 FROM PROJECT TO PROJECT MANAGEMENT

PMBOK Guide includes a set of standard terminology and guidelines for project management. Guide is overseen by the Project Management Institute (PMI) which offers certificates for project management. PMBOK Guide 6th Edition explains the definition of project and guides best practises of project management. This reference will be reflected into managing small projects such as SAP EHS Fiori Cloud.

3.1 Definition of a Project

A project is defined as “a temporary endeavour undertaken to create a unique product, service, or result” (PMBOK Guide 6th Edition 2017, 4). Project contains phases from initiation to closing, and every project is unique based on its content, duration, and scope (Martinsuo 2003, 19). Project life cycle contains phases (figure 3) and every phase is different depending on the project.

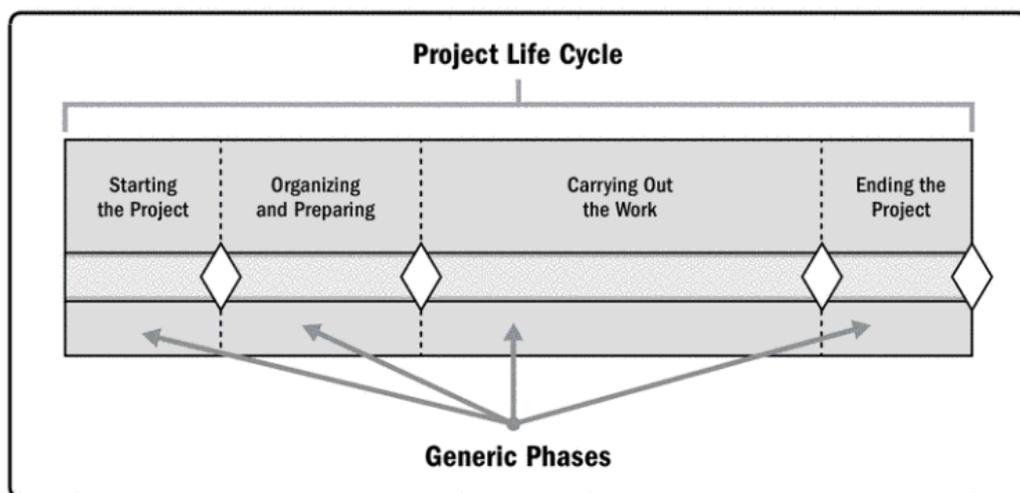


Figure 3. Generic Phases of Project (PMBOK Guide 6th Edition 2017, 9).

Small projects are mainly defined based on their short duration, less than 6 months, quantity of team members, 10 or less, number of skills required is small, scope and definition is narrow, and projects has low costs. (Rowe 2015, 6-7.)

One thing in common for all projects is that they all drive a change, and this change can be an enhancement to existing item or build of completely new item. In the case of SAP

EHS Fiori Cloud project, the goal was to build a new solution with new technology but at the same time, chemical maintenance and document storing processes weren't affected in the backend SAP system.

Since project always drives a change, there is always a factor or factors that initiate the creation of project. (PMBOK Guide 6th Edition 2017, 6.) There were several factors that initiated SAP EHS Fiori Cloud project too. One factor was new technology: the requirement for creating a new solution was due to old portals ended support. There was also a legal requirement, a regulation, that all chemical documents need to be accessible to those who work with chemicals. One factor was also system harmonization, since this new Fiori solution would fit to system landscape well since company had built multiple Fiori applications in the past.

Addition to driving a change, projects also increase business value. This value can be tangible or intangible. In the case of SAP EHS Fiori Cloud application, the value creation was mainly intangible since the benefit of this new application couldn't be easily measured e.g. monetary assets. New solution would ensure users to access the chemical documents and have visibility to all required information and this would lead into more secure chemical handling.

Projects are always temporary, and they will end when reaching all requirements, or when not able to fulfil them. Sometimes lack of funding can lead to project ending (PMBOK Guide 6th Edition 2017, 5). Projects are always limited by schedule with certain scope, goal, resources, and budget and teamwork is required with all stakeholders involved.

3.2 Project Management

Project management is about managing all phases of project to be able to meet all requirements. Based on PMBOK Guide Project management is described as “the application of knowledge, skills, tools and techniques to project activities to meet the project requirements”. (PMBOK Guide 6th Edition 2017, 10). When project management is effective, deliverables are created at the right time, predicting of changes, and adapting to them gets easier. Effective project management also requires open communication, controlled change management and monitoring of all project phases (Rowe 2015, 174).

For small projects, there are best practises that support the management work. These best practises are the minimum tasks that should be conducted during the project. Best practice tasks include creating a project charter, documenting project requirements, using a project schedule to plan and monitor project activities, managing projects risks and communicating to projects stakeholders. (Rowe 2015, 3).

Project management for small projects should cover:

- identification and documentation of requirements
- defining and planning the scope of the project
- creating a schedule
- integration and user acceptance testing and documenting test results
- implementation
- closing project and follow up.

Like major projects, small projects can also be part of a program. Program management mean managing multiple projects. Programs can be formed standalone projects or projects that have dependencies to each other. Portfolio can contain a set of projects or programs, or it can contain both. Figure 4 presents the relations of project management, program management and portfolio management.



Figure 4. Multiple projects can form a program and programs can form portfolio (Usmani 2012).

PMBOK Guide 6th edition divides the organizational project management into projects, programs, and portfolios. Table 1 presents the differences between project, program, and portfolio management. The variables are definition, scope, change, planning, management, monitoring and the measurement of success.

Table 1. The differences of project, program and portfolio management (PMBOK Guide 6th Edition 2017, 13).

Organizational Project Management			
	Projects	Programs	Portfolios
Definition	A project is a temporary endeavor undertaken to create a unique product, service, or result.	A program is a group of related projects, subsidiary programs, and program activities that are managed in a coordinated manner to obtain benefits not available from managing them individually.	A portfolio is a collection of projects, programs, subsidiary portfolios, and operations managed as a group to achieve strategic objectives.
Scope	Projects have defined objectives. Scope is progressively elaborated throughout the project life cycle.	Programs have a scope that encompasses the scopes of its program components. Programs produce benefits to an organization by ensuring that the outputs and outcomes of program components are delivered in a coordinated and complementary manner.	Portfolios have an organizational scope that changes with the strategic objectives of the organization.
Change	Project managers expect change and implement processes to keep change managed and controlled.	Programs are managed in a manner that accepts and adapts to change as necessary to optimize the delivery of benefits as the program's components deliver outcomes and/or outputs.	Portfolio managers continuously monitor changes in the broader internal and external environments.
Planning	Project managers progressively elaborate high-level information into detailed plans throughout the project life cycle.	Programs are managed using high-level plans that track the interdependencies and progress of program components. Program plans are also used to guide planning at the component level.	Portfolio managers create and maintain necessary processes and communication relative to the aggregate portfolio.
Management	Project managers manage the project team to meet the project objectives.	Programs are managed by program managers who ensure that program benefits are delivered as expected, by coordinating the activities of a program's components.	Portfolio managers may manage or coordinate portfolio management staff, or program and project staff that may have reporting responsibilities into the aggregate portfolio.
Monitoring	Project managers monitor and control the work of producing the products, services, or results that the project was undertaken to produce.	Program managers monitor the progress of program components to ensure the overall goals, schedules, budget, and benefits of the program will be met.	Portfolio managers monitor strategic changes and aggregate resource allocation, performance results, and risk of the portfolio.
Success	Success is measured by product and project quality, timeliness, budget compliance, and degree of customer satisfaction.	A program's success is measured by the program's ability to deliver its intended benefits to an organization, and by the program's efficiency and effectiveness in delivering those benefits.	Success is measured in terms of the aggregate investment performance and benefit realization of the portfolio.

SAP EHS Fiori Cloud development project was implemented in a company, where projects are defined based on their classification criteria (table 2) into three different sizes.

Major and minor projects have their own project steering groups though for small projects the need for steering is smaller. Major projects are approved and monitored in the project portfolio steering meetings. Project portfolio steering controls and provides visibility across business functions.

Table 2. Company's classification criteria for projects and enhancements (Company's portfolio classification document).

Classification criteria <small>If any of the Major criteria is fulfilled, project is considered as a Major Project</small>	Project		Enhancement
	Major Project	Minor Project	
Business Case volatility / Project risks	Planned business case has many uncertainty factors requiring high attention.	Core elements of the business case deployment are secured.	Business case does not need special attention.
Organisational Change impact	Global or across BG's and/or functions or including outsourcing activities.	Local or one BG / Function.	Local or one BG / Function.
IT Architecture impact	Creates a major change in company IT Architecture or in preferred technologies.	Is aligned with company IT Architecture and not creating a major change.	Has no change impact on company IT Architecture.
Resourcing need	Resources and competencies needed from several specialty areas. Resources needed globally / cross-functionally. Multi-vendor initiative.	Resources and competencies needed from single / couple of specialty areas. Resources needed locally or from one BG / function. One major vendor.	One person or a small team needed, not full-time.
Dependencies	Major interdependencies to other portfolio projects.	Minor, one-way, dependencies to other portfolio projects.	No major dependencies to other (Major or Minor) projects or IT applications.
External impact of the project	Project has a direct, major impact to customers.	Project is mainly internal development.	Only internal development.

Company uses the stage-gate model, similar to Coopers gate model (figure 5). In the company gate model is used for all project sizes. Project portfolio manager is ensuring that all major projects are following the gate model according to management requirements while minor projects are followed-up by individual businesses and functions owning the business case. Each business and function management may define at which level the common gate model follow-up is required to manage minor projects (Project Portfolio Manager 2018).

Coopers stage-gate model was designed for larger, high risk new-product projects and project breaks into five stages with an entry gate to each stage. During the stages project team executes the key tasks that are vital for the decision at the next gate. At every gate, a decision of the next phase will be made based on the information brought to the gate. In the Cooper model, a project needs to pass all gates to be launched (Cooper 2015).

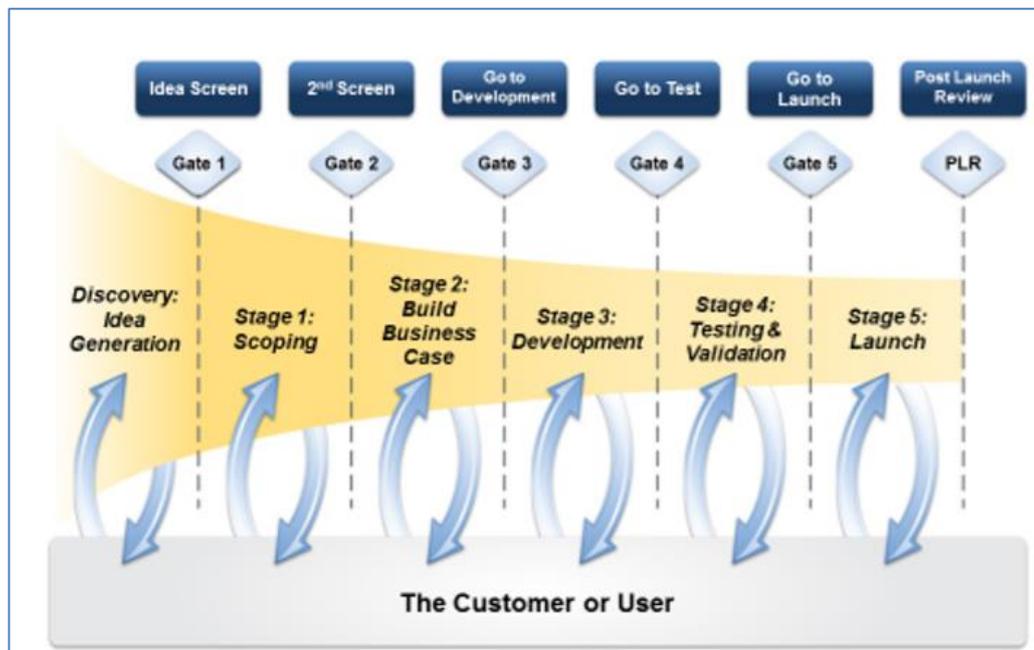


Figure 5. Robert Cooper's Stage-gate model (Cooper 2015).

3.3 Project Management Life Cycle (Framework)

As stated earlier, every project contains phases. These phases form a series and the series of phases form project life cycle that pass from initial to closure (Rowe 2015, 46). Regardless of the project size, project always has a life cycle. The project management life cycle, or project management framework, consists different phases to execute a project. Figure 6 presents the life cycle of SAP EHS Fiori Cloud project. As the life cycle contains development of product, it is also called development life cycle (PMBOK Guide 6th Edition 2017, 19).

Process starts with project initiative, and in this phase the original problem needs to be understood by the project team. In the case of SAP EHS Fiori Cloud project, the problem was discovered when old GCD portal was facing issues with performance and it wasn't supported by the provider, SAP AG anymore.

In the project life cycle, after initiation, definition phase follows. This phase covers documented requirements and definition of scope. SAP EHS Fiori Cloud project scope was clear, and the requirements were documented. Some of the requirements were out scoped since they were more needed in the future and they weren't mandatory for the development in the initial SAP EHS Fiori Cloud build.

Design and prototype phases are about bringing theory into realization with concrete example. In the build phase technical solution is build and delivered for testing. If the testing is approved, project phase execution, implementation will follow. As the last phase, project closing will happen. The life cycle of SAP EHS Fiori Cloud project can be used as a framework for managing small development projects.

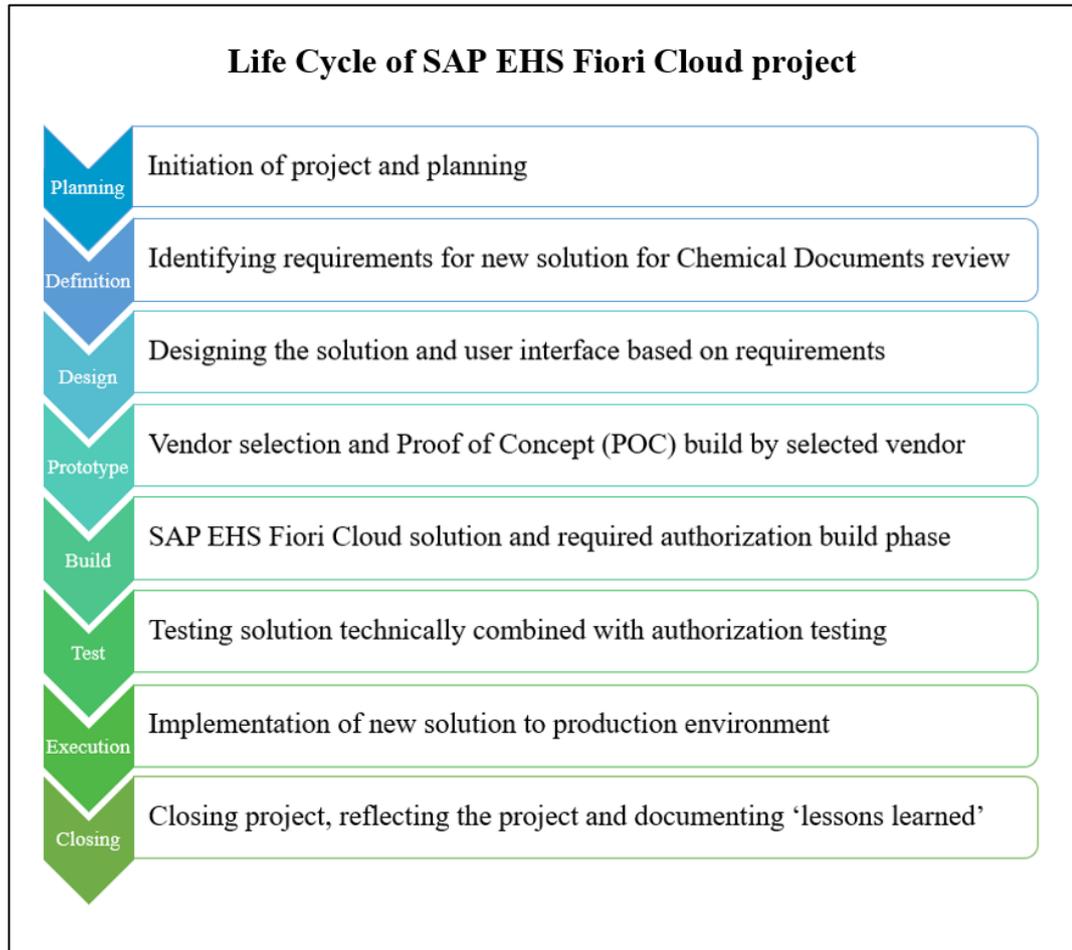


Figure 6. Life cycle of SAP EHS Fiori Cloud project.

Development life cycles can be predictive, iterative, incremental, adaptive or hybrid. Next chapters explain examples of predictive, adaptive and hybrid life cycles.

3.4 Methodology

There are multiple methodologies known in the project management area. This thesis concentrates on agile and waterfall models comparing these to the SAP EHS Fiori Cloud project. Commonly the chosen methodology for each project is based on size, complexity,

and industry. So not all methodologies suit all and they can and should be tailored and mixed. (Whitaker 2012.)

3.4.1 Waterfall Project Model

Waterfall project model is also known as a “predictive life cycle where the project scope, time and costs are determined in the early phases of life cycle” (PMBOK Guide 6th Edition 2017, 19). In the waterfall project model (figure 7) the requirements drive the lifecycle and phases as the requirements are the basis for implementation and deliverables. Waterfall is a predictive life cycle and it means that it is determined beforehand, and any change to scope needs to be well managed (PMBOK Guide 6th Edition 2017, 19). In the waterfall model phases are in sequence. The design will be done based on requirements, and implementation, testing and maintenance will follow as defined. This model is often described as rigid model, and with a little possibilities to change during the project.

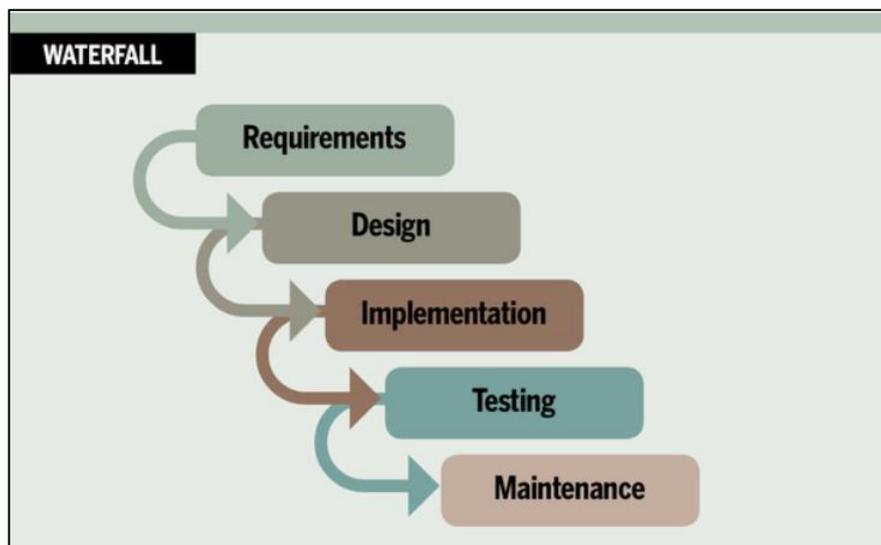


Figure 7. The waterfall project methodology (Alexander 2017).

For SAP EHS Fiori Cloud project, this model was used in the planning and definition phases. Design, and build progressed as waterfall, in sequences, but implementation and testing were executed in rather agile way.

3.4.2 Agile Project Model

“Adaptive life cycles are agile, iterative or incremental. The detailed scope is defined and approved before the start of an iteration. Adaptive life cycles are also referred to as agile or change-driven life cycles.” (PMBOK Guide 6th Edition 2017, 19.)

Agile project model provides more possibilities to iterate changes and change the requirements as well as the designed solution (figure 8). Agile project does not try to define the scope but it’s flexible and iterative.

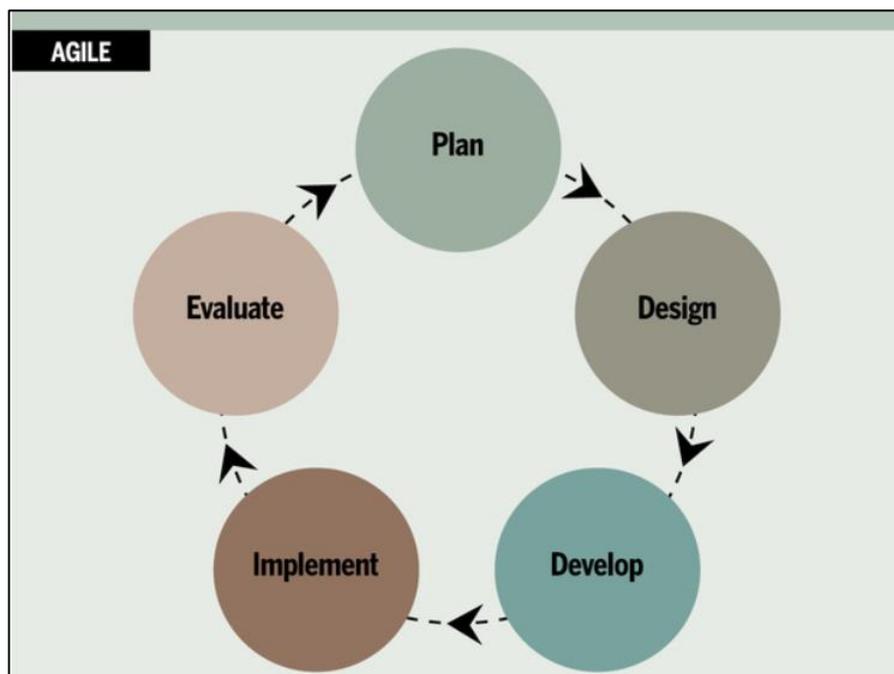


Figure 8. Agile project methodology (Alexander 2017).

In the SAP EHS Fiori Cloud project, it was useful to test the solution in iterative way. Based on the test results some adjustments were done for technical build. Iterative testing turned out to be useful with complex backend solution.

3.4.3 Hybrid Model

“A hybrid life cycle is a combination of predictive and adaptive life cycle. Those elements of the project that are well known or have fixed requirements follow a predictive development cycle, and those elements that are still evolving follow an adaptive development life cycle.” (PMBOK Guide 6th Edition 2017, 19.)

In case of SAP EHS Fiori Cloud project, methodology was mixture of waterfall and agile technique, so called hybrid model (figure 9). Project was first implemented in sequence as in waterfall model where design phase follows the requirement definition phase. When the actual development and testing started, project model was closer to agile, where development and testing was done in sprints. Reason for this change of methodology was found when the development phase matured and became familiar to developers and testers.

Hybrid model is useful when requirements are clear, but the development work needs to adjust based on technical solution. Hybrid model is more flexible than total waterfall, but requirements remain the same.

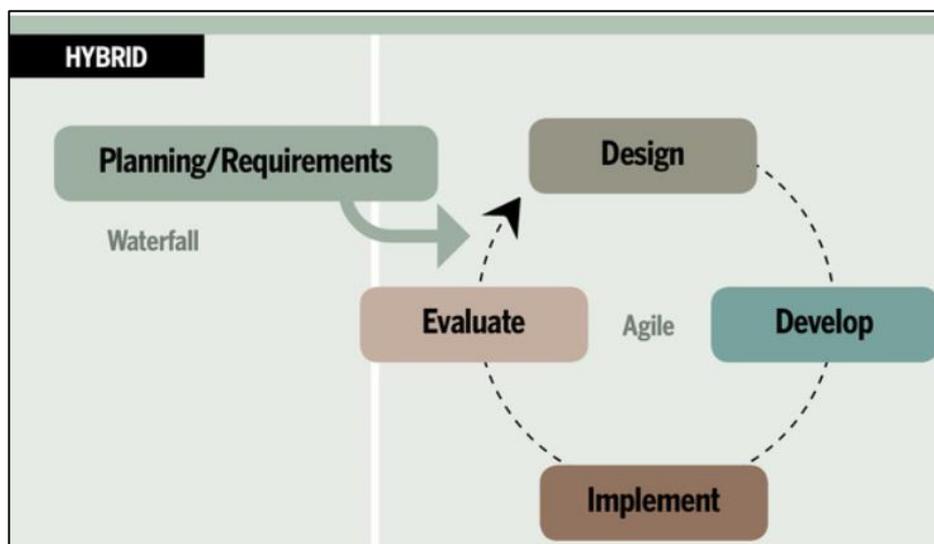


Figure 9. Hybrid model (Alexander 2017).

4 QUANTITATIVE RESEARCH STUDY FOR USEREXPERIENCE

In the beginning of a system development project, it is required that project team understands the current issues and the perspective how to develop a system. One example to investigate the current status is to perform a quantitative research study.

Quantitative research aims to provide answers to questions what, where, how many and how often. To have reliable results from the research, the sample should be large enough. Standardized forms for collecting information are usually used. These forms include options for answers. Quantitative research usually results into understanding of the existing situation, but it won't adequately determine the reasons for it. (Heikkilä 2012, 8.)

Quantitative research study was conducted during SAP EHS Fiori Cloud project and the purpose of the study was to explore the current GCD portals usage: e.g. how often GCD portal was used, what search criteria were used, and what would be the biggest improvement for current portal. A form with questions and multiple option choices was created with eLomake application (Appendix 1), and it was send to 63 GCD Portal users and answers were collected 43. Some of the questions in the form were Likert scale questions where user would need to answer in five-level answers:

- strongly agree
- somewhat agree
- somewhat disagree
- totally disagree
- neither agree nor disagree.

The last question about the biggest improvement for future solution was qualitative question and answerer was allowed to write answer into a text box. The comments by the users were considered in the analyse also.

Answer rate in the research was 69% and analysis was done with IBM SPSS tool by cross tabulation. In the analysis Chi-squared (χ^2) test was also run in SPSS to measure the statistical significance.

The questionnaire was sent to multiple plant users and answering rate was highest at River valley mills (two mills) 32.6%. Based on the answers, most of the users were using the

portal few times a month or even more rarely and results show that portal doesn't have daily usage even the access should be available whenever it is needed. Figure 10 presents the cross tabulation of portal usage on plant level.

Plant level usage of GCD Portal					
How often do you use GCD (Global Chemical database) Portal?					
		Rarely	Few times a month	Few times a week	Total
What plant do you work at?	River valley 1-2	5	5	4	14
	Plant 3	2	3	0	5
	Plant 4	8	5	0	13
	Plant 5	3	6	2	11
Total		18	19	6	43

Figure 10. Usability study was conducted in several mills.

When analysing the search criteria, it is apparent that specifications, or chemicals are mainly searched by product name and work area (figure 11).

The most used search criteria on plant level						
What search criteria do you use mainly?						
		Specification search (e.g. product name)	Work area search	Document search	I change my search criteria	Total
What plant do you work at?	River valley 1-2	5	6	3	0	14
	Plant 3	2	2	0	1	5
	Plant 4	5	1	4	3	13
	Plant 5	3	5	1	2	11
Total		15	14	8	6	43

Figure 11. The most used search criteria on plant level.

Before the survey, there were noticed some issues with current portal functionality. It was important to understand how widely issues were affecting. Results show (figure 12) that users hadn't faced issues as much as expected. On the other hand, this may be because of rare usage and issues may not have been noticed. Only 33% of the users had faced issues in the past 6 months.

Issues faced during the past 6 months and usage				
		Have you faced any issues in the past 6 months?		
		No	Yes	Total
How often do you use portal?	Rarely	12	6	18
	Few times a month	13	6	19
	Few times a week	4	2	6
Total		29	14	43

Figure 12. Noticed issues in the portal and usage rate.

The statistical significance between the faced issues during the past six months and the usage of the portal can be investigated with Chi-Square test. Chi-Square test (figure 13) shows, that P (Pearson Chi-Square) value is 0,993 (99,3%). This means, that there isn't a statistical significance between the investigated criteria's in the cross tabulation. The larger the value is, the less there is statistical significance. If the value is less than 5,0%, results are statistical significant.

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	,015 ^a	2	,993
Likelihood Ratio	,015	2	,993
N of Valid Cases	43		

a. 2 cells (33,3%) have expected count less than 5. The minimum expected count is 1,95.

Figure 13. Chi-Square test results.

Questions where Likert scale was used revealed that when documents are searched in GCD portal, it is not easy to find the correct documents. Only six users answered that it is easy to find chemical data in the existing portal (figure 14).

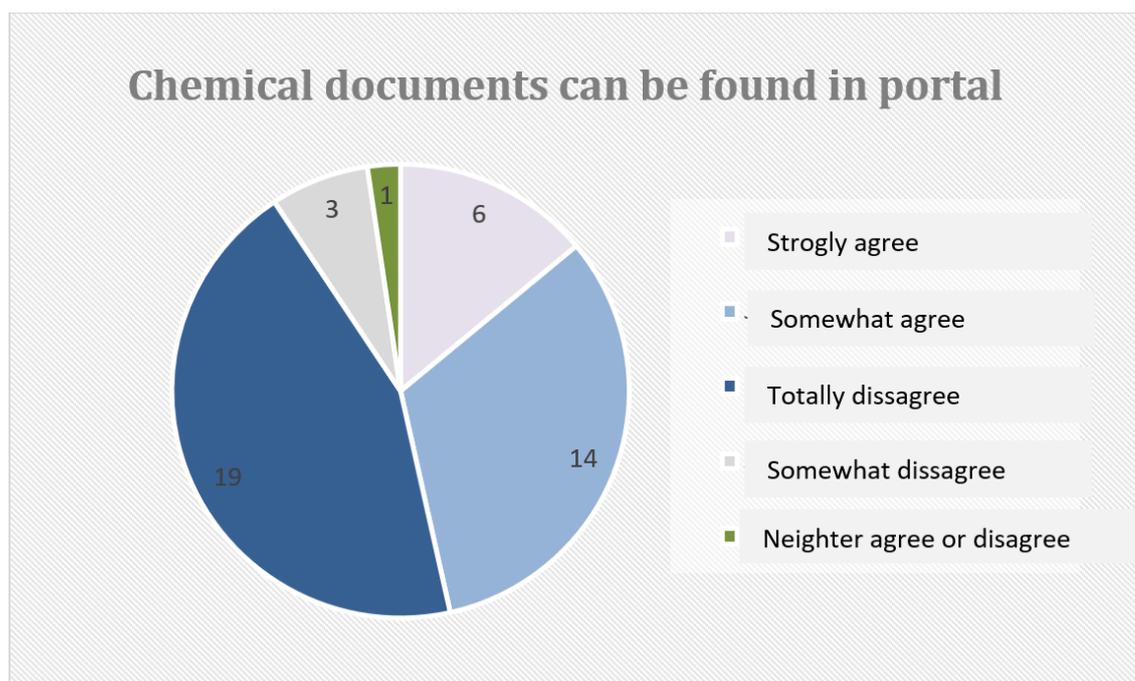


Figure 14. Diagram reveals that documents aren't easy to find in the current portal.

Based on the results of the research study, SAP EHS Fiori Cloud project defined search criteria that would serve the users. It was also considered that user interface should be as simple as possible, and performance should be better than current portal. Navigation to new solution was also paid attention since answers showed that navigation was time consuming since every plant had their own place where to maintain the link for current portal. The link to new solution was added for all users so that it would be as easy as possible to find in the company's intranet. In the future, as the SAP EHS Fiori Cloud solution is implemented, and users have been using the solution, a new research will be conducted. Based on that new developments can be considered to SAP EHS Fiori Cloud solution.

Quantitative research study was valuable source when SAP EHS Fiori Cloud team was defining the new application. Gathering information was effective and gave an insight of the current state. In every system development, one important thing is to identify the current state to be able to develop the system to match the required change.

5 SAP EHS FIORI CLOUD PROJECT

SAP EHS Fiori Cloud project was initiated by the requirement of providing chemical users the visibility to chemical documents. The requirement is also based by the REACH regulation. The need was intangible, it can't be measured in terms of money but it's more of regulation requirement that all users who work with chemicals need to have the access to work safety cards and material safety data sheets.

Project started with initiation of project when it was discovered that old Global Chemical Database (GCD) portal was no longer supported by supplier, SAP AG. There were issues with system performance. These issues were severe, since the documents were incomplete when opened in the GCD portal. Some of the pictograms and phrases were not visible in the MSDS document and couldn't be used when handling chemicals.

After initiation of project, in the definition phase, all requirements were gathered and documented. After defining the requirements and designing the new solution, selected vendors were asked a proof of concept (POC) since POC is a good way to demonstrate that theory of solution can be built in practice. Vendor for building a new solution was selected based on the POC outcome. Next sentences tell about SAP EHS Fiori Cloud project and its phases. These chapters give insight of how project was managed.

5.1 Discovery and planning

In major projects, in the beginning of the discovery phase, project team needs to understand the idea of the project and decide whether it is feasible or not. Decision of the project can be made based on the documented sequence of events such as identifying the project, documenting the idea, and requesting the approval from management after review. Management can either hold the project for future or authorize a feasibility study. If project is approved, there should be sponsor, and project manager appointed. In smaller projects discovery phase and decision of project can be made without formal documentation, verbally or via emails. (Ajam 2018, 145-146.)

If project has been decided to start and management has approved it, planning of the project may start. For small projects a planning tasks should include the following tasks (Rowe 2015, 108):

- scope statement
- WBS
- project schedule
- risk management plan.

Most of tasks mentioned above were taken into consideration during SAP EHS Fiori Cloud project too. Company uses Service Now tool for managing small projects, also known as demands and in this tool scope, project and risks are considered. A separate work breakdown structure (WBS) was not created, as Service Now tool contains the tasks for build, testing and implementation. Communication between stakeholders and team members is important especially in the planning phase and it should be as clear as possible.

In the planning phase the roles and responsibilities need to be clear to ensure the collaboration between different stakeholders. An assignment matrix can be used to identify the roles and responsibilities. This RACI matrix can be used to share the information who is responsible, accountable, who should be consulted and who needs to be informed. RACI matrix was not used in SAP EHS Fiori Cloud project, but it would have been useful. Matrix gives a clear view who is responsible on different areas.

In project planning phase, SMART method can be helpful to ensure all project goals. In this method the goals should be specific and answer questions: who, what, where, when, which, and why. Goals should be measurable, and they should create criteria that you can use to measure the success of a goal. Goals should be attainable and identify the most important goals and what it will take to achieve them. SMART (figure 15) goals should be realistic, and you should be willing and able to work toward particular goals. Goals should be timely and create a timeframe to achieve the goal. (Esposito 2015.)



Figure 15. SMART goals (Esposito 2015).

Sandra Rowe describes the PALM principle for processing small projects (Rowe 2015, 53):

- **P**lan project activities
- **A**nalyse the situation and ask questions
- **L**ead the project activities
- **M**onitor and control time and resources.

The PALM principle is suitable for small project processes since it requires minimum of documentation. Addition to documentation, deliverable in this phase is plan of project and schedule. Scope and requirements will be defined in the next phase.

5.2 Definition and scope

Project definition is about defining the scope, understanding the problem and identifying the needs. Also, solution should be identified, all requirements should be documented, and project implementation facilitation needs to be done. (PMBOK Guide 6th Edition 2017, 4.)

There are six processes for scope management based on PMBOK Guide. During SAP EHS Fiori Cloud project, two of these were used: scope of the product was defined, and requirements were collected (PMBOK Guide 6th Edition 2017, 1). When defining the project scope, requirements are viewed and documented. In SAP EHS Fiori Cloud case, the scope was written together with the process owner and key users. The deliverable from this phase was a document of definition of the new solution, also called functional specification.

It's useful to categorize the requirements in different areas (figure 16). In the case of SAP EHS Fiori Cloud project there were three different categories where requirements were divided: functional requirements, technical requirements and security requirements.

For SAP EHS Fiori Cloud project, requirements were clear as the need for new portal was inevitable. There were clear functional requirements of how the system should look like, what search criteria should be available and what kind of result list should be visible for user. Requirement was to have user friendly user interface and data to be accessible globally, multiple languages needed to be available. Functional requirements were partly gathered based on quantitative research study that will be presented later in this thesis.

Security aspect needed to be considered as it was one of the requirements to have access to chemical data in case of an accident. This meant that every user working with chemicals, should have the visibility to document safety documents. This requirement was even specified so that the requirement was to provide three different user groups with different visibility to documents. These user groups should be plant level office users who would have the visibility to only plant level documentation, business users with visibility to business area related documents and global users who would have the visibility to all documents. In the SAP ERP system released chemicals are maintained on work areas of plants. Visibility to plant level chemical documents was aimed to be built with standard authorization concept. However, since tailored system solution, restriction needed to be done with combination of Fiori and backend roles. When restricting authorizations, concept should be built in the backend since Fiori will call backend services and will check the maintained authorizations. This way it could be ruled who could see documents that were really needed at plant level. Part of the security aspect was to have authentication that would happen with Single sign-on (SSO) which means that no separate logon is needed.

From the technical point of view, company's technical framework needed to be considered when choosing the solution. Company aims to have cloud platforms that work as flexible environments.

Requirements	Functional Requirements
	<ul style="list-style-type: none"> - All chemical data needs to be accessible in one place based on work area - Changes in the chemical data needs to be updated - New solution needs to be language independent and it should have possibility to translate into different languages - Language of the solution as well as language of the documents to be variable - MSDS and WSC documents need to open in solution - EU ECO Label, RSL, Nordic Swan, FDA and BFR labels need to be visible in solution
	<hr/> <p>Security related requirements</p> <ul style="list-style-type: none"> - Three user groups need to be created and visibility needs to be restricted - Logon needs to be SSO - There needs to be possibility to load other documents such as risk assessment document
	<hr/> <p>Technical requirements</p> <ul style="list-style-type: none"> - SAP Fiori application will be built on Cloud platform - SAP Fiori needs to be build on existing backend process <hr/>

Figure 16. Requirements for SAP GCD Fiori Cloud project.

The purpose of scoping is to identify the requirements that should and should not be added in the original development. The “out scoped” requirements can form a project of their own afterwards, when developing the existing application.

5.3 Design

In the earlier phases, project has been planned and requirements are documented. In the following design phase project should be able to create an understanding how the solution will be build, and design should work as basis for build partner for the technical solution.

In the design phase, SAP EHS Fiori’s technical solution and user interface was designed. Design needed to consider how the new SAP EHS Fiori interface will look like, what kind of search criteria’s it will include and what will the result list look like. The comparison between old and new solution will be done and based on the requirements, and a mock up can be sketched. SAP provides tools, design stencils, for designing custom Fiori layouts. This way mock-ups of the solution can be designed without actual development in Fiori. A mock up picture can also be sketched with other tools such as MS Excel. Design phase will provide more insight to the becoming solution as the requirements will be designed in sketches.

When comparing the GCD portal and SAP EHS Fiori, there are multiple differences. GCD portal contains multiple search criteria's and tree-like result list (picture 1), but the SAP EHS Fiori was designed as simple UI as possible (picture 2-3).

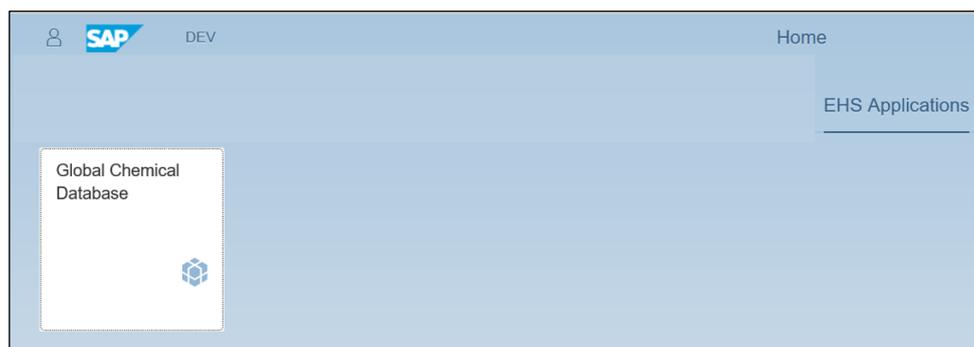
The screenshot shows the 'CHEMICAL DATABASE' search interface. It includes a search bar for 'Plant' and 'Work area', a 'Chemical' section with fields for 'Product Name (e.g. "acetone")', 'Other Search Criteria', and 'Valuecode (e.g. "BASP" or "50.00.0")', a 'Report criteria' section with 'Report category', 'Version number', and 'Language' (set to English), and a 'GlobalONE Material Master' section with 'Material (GlobalONE)' and 'Description (GlobalONE)'. Below the search criteria, it displays 'Reports found : 3' with a tree-like structure of results:

- 000000027183 FUEL 200 FUEL 200
 - VEND-MSDS Vendor MSDS
 - 1.0 English
- 000000027313 FUELSOLV FS3954 FUELSOLV FS3954
 - 000000000011688945 INHIBITOR FUELSOLV FS3954 1000KG/BAG
 - VEND-MSDS Vendor MSDS
 - 1.0 English
 - ZGCD_WSC English GE WATER & PROCESS TECHNOLOGIES (UK) LP BOILERHOUSE 7
 - Workplace Safety Card

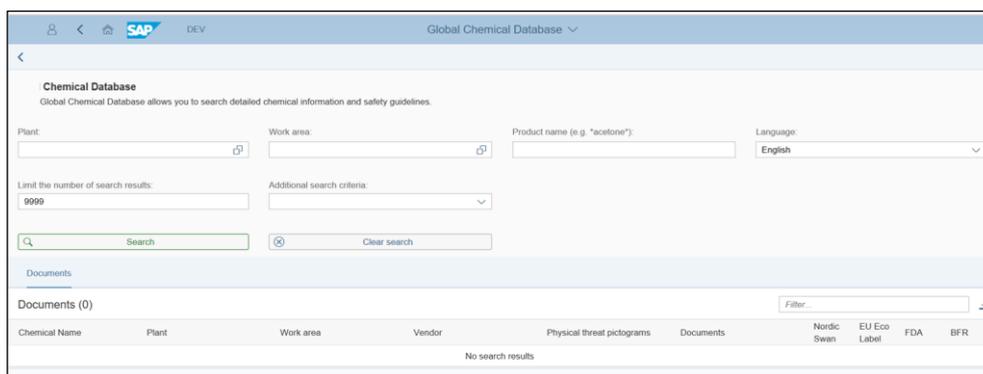
Each result entry includes a document icon, version number (1.0), and language (English). The final result also includes 'BOILERHOUSE 7'.

Picture 1. Chemical database portal search criteria and result list.

SAP Fiori application is presented as tile (picture 2) where user can select the application (in this case the Global Chemical Database application). After selection, search criteria and result list are presented on the same screen (picture 3).



Picture 2. SAP Fiori tile was named Global Chemical Database.



Picture 3. EHS Fiori search and result on the same screen.

In the design phase of the project, the deliverable, the outcome, is the approved functional specification document with sketched visual prototype of the solution to be built. This specifies the upcoming solution and guide the following build phase. The design phase also included the build partners technical view of how the solution will be built on cloud platform.

5.4 Build

In build phase of project, technical solution will be build. For selecting a build partner for SAP EHS Fiori Cloud application, the selection was done based on POC. POC is usually a small part of the whole development and it realizes the theory of the specifications and design in practice. POC also proofs that solution can be built as designed and that build partner is able to build the solution as designed.

When the build partner for SAP EHS Fiori Cloud application was selected, the actual solution build phase began. This phase is usually the most challenging and the longest. The solution was built by the definition from the last phases but in the upcoming test phase execution changed from technical and functional perspective as the testing moved on. In this case the build became iterative and based on testing, some changes were made in the technical solution. However, the requirements and scope remained the same during the build phase.

5.5 Testing

Usually software development projects contain three testing: unit testing (UT), integration testing (INT) and user acceptance testing (UAT). In SAP EHS Fiori Cloud project there were integration testing done by build partner and user acceptance testing by solutions process owner.

SAP EHS Fiori Cloud project's testing was iterative and done based on test scripts that were created for testing. Test scripts are test cases where tester follows steps and adds all results to document. After all test have passed, UAT is approved. Usually there is separate system environment for UAT's before implementing the new solution into production environment. In the test phase errors are detected and in iterative testing some changes to the technical solution can be made.

Testing new authorization roles in SAP EHS Fiori Cloud project needed to be taken care very carefully since the authentication was done via Single Sign-on (SSO). When authentication happens via SSO, test user ID needs to be maintained in the backend system since SAP Fiori checks the authorizations in the backend. In this case user needs have the access right to test system. To be able to have reliable test results, tester needs to have only SAP EHS Fiori roles in the backend system and AD groups for cloud platform.

During the tests, challenges were faced, because of the backend solution, that was complex and tailored in the company. In the end all requirements were implemented, and roles were tested. Deliverable in testing phase is approved UAT documentation and in the case of SAP EHS Fiori Cloud project, the results were stored in Service Now tool.

5.6 Execution

The deliverable in case of SAP EHS Fiori Cloud project was new solution for chemical document search. This solution was implemented into production system in January 2018 into production environment and trainings, followed implementation. Project deliverable can be any unique and verifiable product, result, capability to perform a service that must be produced to complete a process, phase, or a project (Rowe 2015, 48).

In the SAP EHS Fiori Cloud project, the deliverable was the new solution build for searching chemical information, hazardous products, pictograms, and other required information. The solution also provided a possibility to open materials safety data sheets (MSDS) and work safety cards (WSC).

5.7 Closing

In the last phase of project life cycle, closing is about evaluating and reflecting the whole life cycle of the project. Documenting a “lessons learned” for future projects should be in place and it is the Project Manager’s task to check and ensure that all phases are closed, and tasks are completed. The evaluation of the project should contain questions such as was the project outcome according to plan and was the project successful. Figure 17 provides a task list for completing all needed tasks that needs to be completed when closing the project.

Project Management		
No.	Description	Cmpl
1	Project Deliverables Approved	Yes
2	Issues Resolved	Yes
3	Final Status Report Produced	Yes
4	Success Criteria Achieved	Yes
5	Resources Released	Yes
6	Project Survey Completed	Yes
7	Lessons Learned Conducted	Yes
8	Project Closure Report Produced	Yes
9	Project Data Archived	Yes

Figure 17. Project Management chart for closing a small project (Rowe 2015, 138).

Every project should be also evaluated by its success. For small projects success can be defined based on time, within budget, and meeting the requirements of the project stakeholders. (Rowe 2015, 12.)

Success of project can be defined based on the outcome of:

- within the time allocated, schedule
- within the budget and costs
- at the performance level
- with acceptance by user or customer
- with minimum changes in scope
- without disturbing the main processes in the organization
- without changing the culture of the corporate.

(Kerzner 2017, 6.)

In small projects schedule is often short and even with all definitions, there can be deviations that can lead to overrun in schedule. In SAP EHS Fiori project, the schedule did not hold as the backend solution was complex, and lead into multiple iterative user acceptance test rounds. As the schedule stretched, also budget exceeded. Still if the performance is high and the requirements defined in the scope meet, the success can be partly fulfilled. Sometimes compromised needs to be made between the solution build and schedule. It was also the case in SAP EHS Fiori Cloud project. The decision about the final structure and functionality was agreed to be accepted as accomplished even if the performance was not as planned. The most important thing was the usability when user searched one document at a time.

In the year clock where SAP EHS Fiori Cloud project was planned, its visible that the schedule was delayed almost six months. In the first plan the implementation was to execute in September 2017, but it was postponed several times since the selection of vendor was done after POC creation (figure 18).

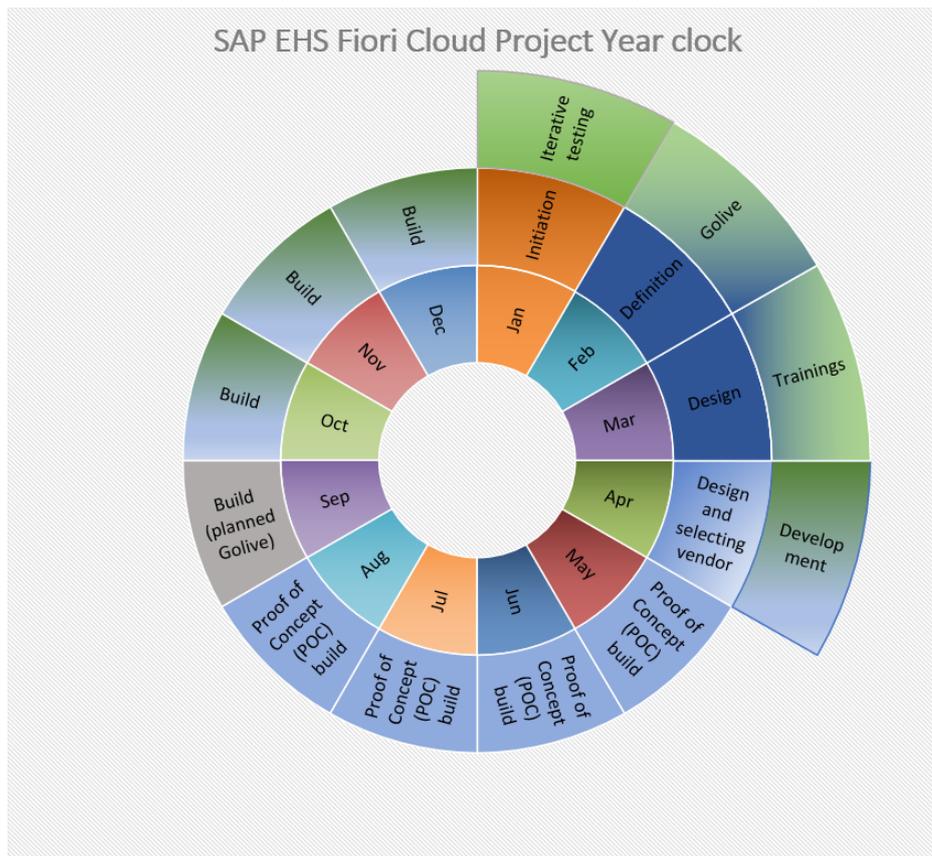


Figure 18. Planning of the project was scheduled in year clock.

After implementation, the trainings were held, and next developments started. Projects change management in this case was essential since there were user authorizations that needed to be added and this caused some resistance among the users. Considering licenses and the requirement of restricting visibility to plant level, changed the user's way to access the application instead of portal. This lead into resistance since all users needed to be requested new authorizations for SAP ERP.

6 CONCLUSION

All projects are unique and methods for project management varies. Sometimes IT projects contain complex system development combined with new technology. Technology itself is developing all the time and the capabilities are increasing, too. Project management should be able to stay flexible and it should be ready for changes as the technology and its potential increases.

The objective of this thesis was to provide a framework for other small IT projects in the company. Small projects weren't taken into project portfolio steering and for that reason there wasn't a formal guideline to manage smaller projects. This thesis provides guidance for small projects and introduces the most important tasks that should be taken into consideration when managing small projects. It also introduces way to understand current status by using quantitative research study.

In the future, the guideline that this thesis provides, will be used in the company as guidance for future project management in small system developments. Also, quantitative research study can be rearranged since the template for questions is ready. The hybrid project lifecycle used in SAP EHS Fiori Cloud project can be used as a benchmarking in new projects especially with new Fiori cloud projects. Thesis also proves that no matter how small projects may be, they should be managed to guarantee the best outcome of the project.

SAP EHS Fiori Cloud project and project management models presented in this thesis can be used as benchmark and a reference for other companies also. The hybrid project model is flexible, and testing and implementation complements each other. Figure 19 presents the roadmap that contains some of most essential tasks in every phase. These phases are presented in the thesis's chapters and they are compressed into one roadmap figure. Tasks of the roadmap can be easily iterated as the hybrid model contains the early project phases as waterfall model and later phases iterative as agile model. Team building, communicating and having a clear understanding of the target of the project should be done in the initial phase of the project. Comprehending these, will improve the projects progress along the becoming process phases.

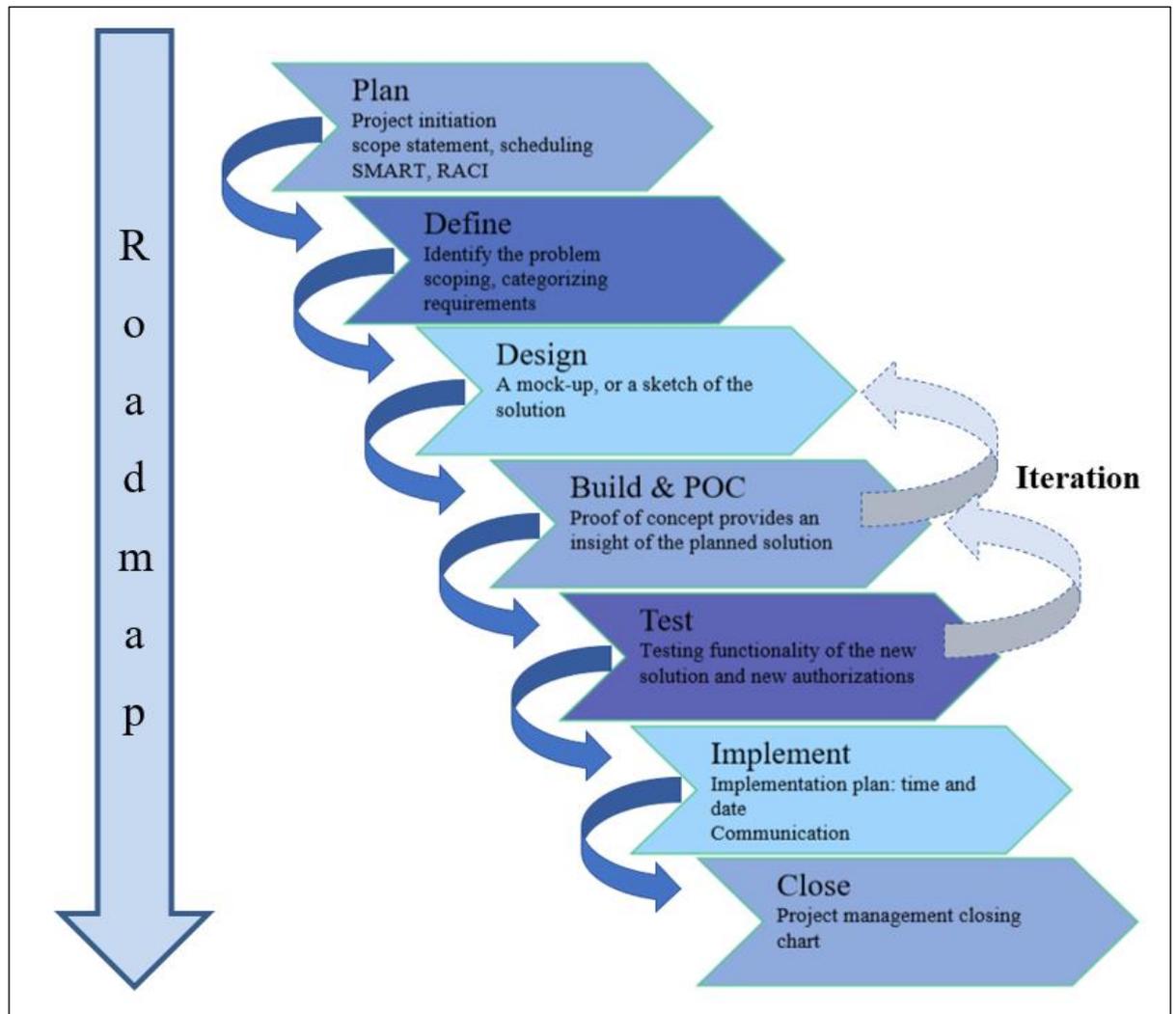


Figure 19. Small project roadmap where iterations happen during build phase and in testing phase

In the SAP EHS Fiori Cloud project, user experience was one of the most important point of view that drove the change. A quantitative research study that was conducted during the project, was effective way of gather information and understanding the end users' way of working. A research study gave an insight of the overall usage of the current portal, and the needs for future requirements, and desired features. Based on the study, there were two most important things that rise to the top features. These top features were performance speed and easy to use -application. The selected technology, SAP Fiori application, was a suitable, since it provided the possibility to be developed based on the business rules in the backend system.

When reflecting SAP EHS Fiori Cloud project, and its success, there are multiple factors that can be evaluated afterwards. Project schedule, budget, outcome of the solution, and especially the fulfilment of requirements can be used for measuring the project success.

During the SAP EHS Fiori Cloud project, the objective was never lost. It was clear, that this new application was required for users to access the chemical documentation on plants where chemicals are handled. This requirement was fulfilled. The product (application) fulfilled most of the defined requirements except the performance that still need to be developed in the future. Performance issue was due to the complex backend solution and improving this, development in the future is still needed. From the schedule and budget point of view, the process did not succeed perfectly, but the deviation was reasonable, and it did not overload the project team.

There are multiple researches conducted when trying to explain why IT projects fail. Based on different researches (Neimat 2005, Marr 2016), there are some typical reasons for IT project failure. Some common reasons are:

- *poor planning*
- *unclear goals and objectives*
- *objectives changing during the project*
- *unrealistic time or resource estimates*
- *lack of executive support and user involvement*
- *failure to communicate and act as a team*
- *inappropriate skills.*

I would also add to this list a clear defining of roles and responsibilities, lack of project structure, and poor documenting. Roles and responsibilities should be divided in the project team and one good tool is RACI matrix, to ensure that everyone knows their tasks is. RACI matrix can be a chart that explains the roles and point out the person (by name) responsible.

SAP EHS Fiori Cloud application was built on top of a complex backend solution and with new technology. Technical solution of the backend system was not clear in the beginning of the project and this caused extra time for definition and build time. Testing was iterative and took more time than expected but, in the end the application was ready for implementation. After the implementation, all new users needed to request authorizations for the application. To simplify the authorization requests, it was decided to organize a mass request for all SAP EHS Fiori Cloud users. A mass request was to help the users to request the new required roles.

Even the SAP EHS Fiori Cloud projects schedule was delayed, and budget was override, the focus of what was the meaning of the projects and the what was needed to be accomplished, was never lost. Focus was clear the whole time and the deliverable was as required in the initial phase of the project. Using new technology and performing a research study about the user experience gave a good understanding about the user needs for developing a new application when renewing the old portal that had come to the end of its life cycle.

The purpose of the project was to provide a reliable system that would provide global view to chemicals used in the company. The aim was to replace the old system that had come to the end of its life cycle. The development of the new application needed to take consideration the complex backend solution as the Fiori application was built on top of the existing functionality. In the end purpose of the project was fulfilled, and new application was implemented into production in 2018. It has been used since then and improvements are and will be done in the future. The requirement for renewing the old portal was fulfilled with new technology and new application.

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APPENDICES

Appendices 1. Questionnaire of EHS Portal and Fiori applications

Kyselyn tarkoituksena on tutkia GCD (Global Chemical Database)-portaalin käyttöä loppukäyttäjänäkökulmasta.

GCD -portaalin käyttö
 Kysely toteutetaan osana Tampereen ammattikorkeakoulun ylemmän korkeakoulututkimus opintoja kursilla Kvantitatiiviset tutkimusmenetelmät, vaikuttavuustutkimus

Kysely

Kysymys 1
 Millä tehtaalla työskentelet? River valley 1-2
 Plant 3
 Plant 4
 Plant 5

Kysymys 2
 Kuinka usein käytät GCD (Global Chemical Database)- Portaalaa? Päivittäin
 Muutamia kertoja viikossa
 Muutaman kerran kuussa
 Harvemmin

Kysymys 3
 Mitä hakutoiminnallisuutta käytät useimmiten? Käyttöpaikkahaku (Yksikkö/käyttöpaikka)
 Aine-haku (mm. tuotenimi)
 Raportin mukaista hakua (esim.KTT)
 Valitellen hakutapaani

Kysymys 4
 Vastaa mielestäsi sopivimmalla tavalla seuraavaan väittämään: Portaalii on helppo navigoida ja se löytyy helposti Täysin eri mieltä
 Jotseenkin eri mieltä
 Jotseenkin samaa mieltä
 Täysin samaa mieltä
 En osaa sanoa

Kysymys 5
 Vastaa mielestäsi sopivimmalla tavalla seuraavaan väittämään: Portaalii on helppo käyttää Täysin eri mieltä
 Jotseenkin eri mieltä
 Jotseenkin samaa mieltä
 Täysin samaa mieltä
 En osaa sanoa

Kysymys 6
 Vastaa mielestäsi sopivimmalla tavalla seuraavaan väittämään: Löydän portaalista etsimäni kemikaalin Täysin eri mieltä
 Jotseenkin eri mieltä
 Jotseenkin samaa mieltä
 Täysin samaa mieltä
 En osaa sanoa

Kysymys 7
 Oletko kohdaneut ongelmia portaalii käytössä viimeisen 6kk aikana? Kyllä
 En

Kysymys 8
 Vastaa mielestäsi sopivimmalla tavalla seuraavaan väittämään: Ongelmatilanteissa saan nopeasti ja tehokkaasti apua Täysin eri mieltä
 Jotseenkin eri mieltä
 Jotseenkin samaa mieltä
 Täysin samaa mieltä
 En osaa sanoa

Kysymys 9
 Kuka auttoi ongelmatilanteissa? Tehtaan key user
 IT-tuki
 Kollega
 Prosessin omistaja
 Joku muu?

Kysymys 10
 Mikä olisi suurin parannus portaalissa?
 Miksi?

Tietojen lähety

Tallenna Estäytö URL

Kiitos vastauksesta!

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