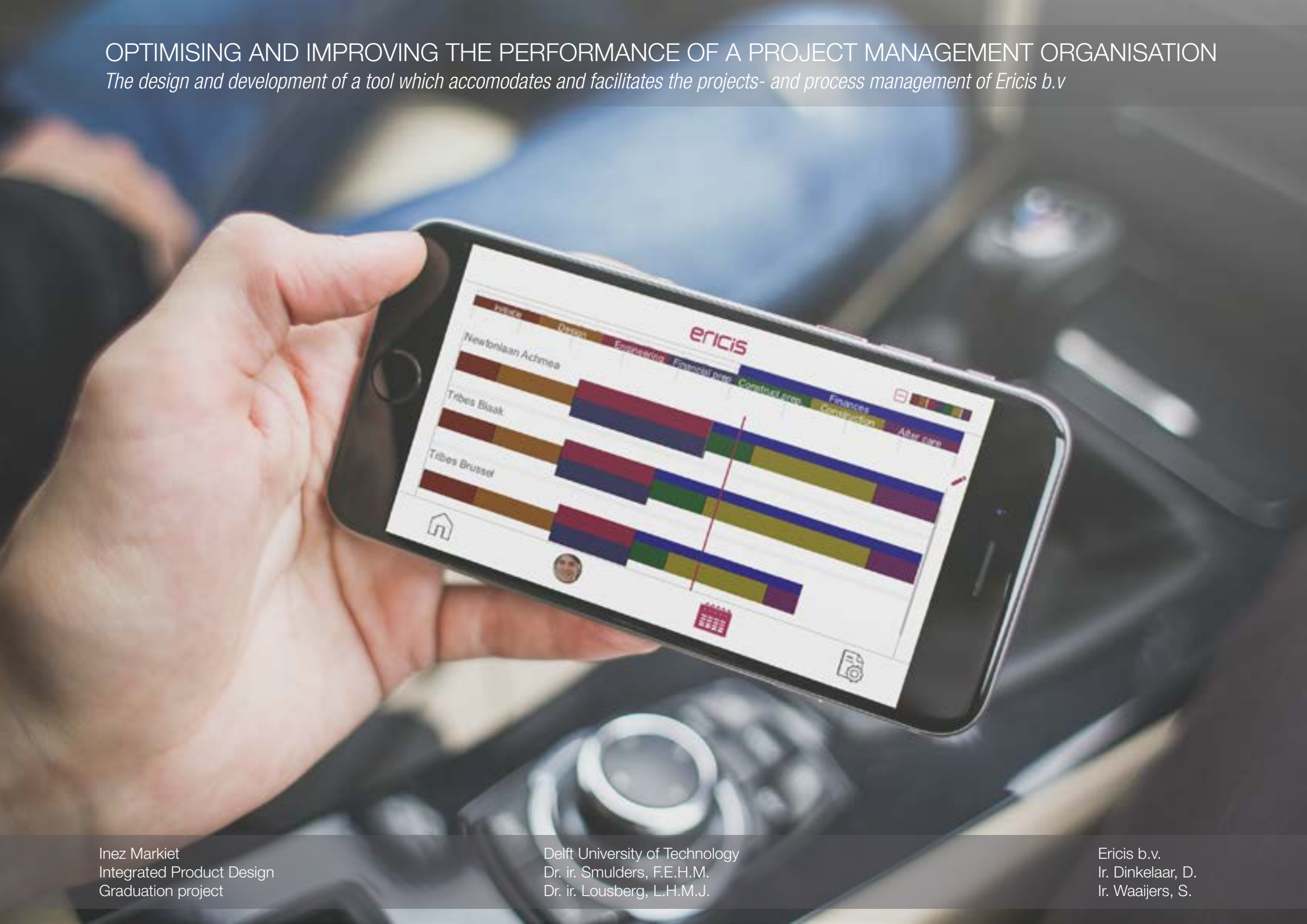
OPTIMISING AND IMPROVING THE PERFORMANCE OF A PROJECT MANAGEMENT ORGANISATION

The design and development of a tool which accomodates and facilitates the projects- and process management of Ericis b.v



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ACKNOWLEDGEMENT

appreciation

First and foremost I would like to thank my mentoring team: Donald Dinkelaar, Simone Waaijer, Frido Smulders and Louis Lousberg, for their time, expertise and mentoring throughout my graduation project. I am extremely grateful to have been a part of Ericis b.v., where I was accepted to conduct my entire graduation project. It has been an honor to design an develop a product-service which will support this organisation.

I thank both Donald Dinkelaar, the CEO of Ericis b.v., and Simone Waaijers, a project manager of Ericis b.v., for their valuable time and feedback and their mentoring throughout the project. Although they had very busy schedules, they both provided me with valuable feedback at times, which I needed in order to improve or develop the project further. Thank you both for giving me this opportunity to graduate within your successful company.

Hereby, a special thanks to the CEO, Donald Dinkelaar, for motivating me and believing in my work and potential. I will cherish and remember the motivational words you have shared with me, as I continue to learn and develop. From what I have experienced you are a great leader to the team, and although you might shake things up every now and then with your decisions and ideas, these are much appreciated by your team, who are able to learn from your expertise. I wish Ericis b.v all the best and even more success in the future.

Also a special thanks to Simone Waaijers who is a valuable 'player' within the organisation due to her intelligence, her ability to simultaneously manage multiple projects together with her numerous other qualities. Thank you for your feedback which helped me to improve essential aspects of the project. I wish you all the best in your future career and from what I have experienced you are developing into an amazing leader.

Secondly, I would like to sincerely thank my Tu Delft supervisors, Frido Smulders and Louis Lousberg for all the valuable input and feedback which helped me to constansly develop, improve and optimise this project. Thank you both for your time and effort.

I remember a 'Unilever' workshop given by Professor Smulders, after which I told my teammates: *'I really hope that this professor can be my Chair whenever I have a graduation project'*. Throughout only this one workshop, the professor his expertise on design engineering was visible to me. Once I found this graduation assignment, and it being on project management in real estate, it made me doubt whether you would be interested to mentor me in such a project. What are the odds that professor Smulders together with Professor Lousberg work on a project related to this subject. It was quite a consideration for both of you since your schedules were already overly occupied, however both of you supported me and decided to mentor me throughout my final project on the TU Delft. I am extremely grateful for this.

Professor Lousberg, hereby a special thanks to you, especially knowing that it is not quite common for a professor from the faculty Architecture to mentor a student from the faculty Industrial design engineering. Regardless of this fact, you accepted my request to be a part of the mentoring team and to consult me throughout this project with your expertise on project management and real estate.

Thank you all for your valuable feedback throughout the most important project of all my educational years.

Lastly I would like to thank my Mother and my Sister who have supported me unconditionally throughout this project. They have always motivated and believed in me. Over the past year I have dealt with several personal lows however these two valuable people in my life, together with my faith, kept me focused on my vision.

Again, thank you all for everything, no effort has gone by unnoticed.

“It’s not the destination, it’s the journey. That’s the dream.”

- Kobe Bryant

GLOSSARY

defined terms

Core problems	The root causes of the manifested problems, the underlying bigger problems
Problem symptoms	Manifested, visible, obvious problems
Ideation	A process in which ideas are created
Conceptualisation	A process in which a concept is created
Ericis X	Undefined product and or service for Ericis b.v.
Eri-tool	Ericis project & process management Application(tool)
EPM	Ericis project management
Design process	A process throughout which specific activities are conducted in order to discover, define, develop and design. This process exists out of several phases: Research & Analysis, Idea generation, Concept development & design and Embodiment
Design requirements	Requirements based on which the design process is conducted
Design brief	A document about a design project which descried the deliverables, the scope and the design requirements.

EXECUTIVE SUMMARY

brief overview

Ericis b.v is a dynamic real estate organisation which provides consulting, management, design and several other services in real estate. This project concerns their real estate consulting, design and re-development department, in short the project management department. The operational team of this department is relatively small and exists out of six people. Although this department is quite small, their demand on the real-estate market is not. The consistent successes of their projects, which are created through their high level of execution and premium services and products, cause an increase of demands and projects.

A consequence of this success is that an imbalance is created between the amount of work and the available employees. As the pressure and workload increases the team starts to experience numerous difficulties which refrain them from seamless project management processes.

Once a lot of projects start to run simultaneously, certain existing problems in the organisation, of which the team might have been unaware, become very prominent and can't be ignored anymore. One of the most prominent difficulties the team encounters is the lack of a overview regarding the project processes. The organisation indicates that next to the large number of projects and small number of employees, this problem is foremost caused by the lack of a standardized project process. The team does not have a clear documented process which they can hold onto when for example the projects increase and the overview blurs.

In order to solve the difficulties they cope with, Ericis aims to take two steps. The first step is active recruitment of new additions to the team in order to have the capacity to deal with the increasing amounts of assignments. The final step concerns this graduation project and it the implementation of a tool which supports and accommodates the organisation with the difficulties they face. Based on the situation within the organisation the following design challenge is created.

'Design and develop a tool which facilitates the management of the project process as well as the management of all running projects.'

It is expected and assumed that this tool will both support the team dealing with the difficulties and solve the existing situation.

In order to solve this design challenge a design process is conducted. This design process exists out of a research & analysis phase, a ideation phase, a conceptualisation phase and finally a embodiment phase. Within the research & analysis phase, research questions created based on which studies were conducted in order to discover the exact problems within the organisation and where these stem from and what exactly is required in order to solve these. An internal and literature study are conducted of which the internal study is a study inside the organisation.

The research question of the internal research was to discover the underlying core problems of the design challenge. The answer to this question is the following problem statement.

The core needs for a seamless and optimal project- and process management are: organisational structure, process structure, process documentation and clear task and responsibility divisions.

Within the literature research the solutions to the core problems had to be retrieved in order to discover the design requirements to which the tool has to suffice. This research resulted in a positioning statement; an abstract definition of all the design requirements to which the final product and or service has to suffice.

Ericis X, is a supporting projects & process management tool, for the Ericis Project Management(EPM) team. They seek for process structure, organisational structure, a clear division of tasks & responsibilities and process documentation. It does so by providing and facilitating management support regarding the phasing, hierarchical lines and decision documentation of each project.

This phase is followed by the idea generation phase. Within this phase ideas are generated based on the problem- and positioning statement. Four different methods are applied to facilitate the idea generation. These sessions resulted in numerous ideas and foremost features which have to be implemented in the final design. Based on a thorough selection and merge of ideas and features a final idea is defined. Following the final idea is the conceptualisation phase in which the final idea is developed into a concept.

A literature study is conducted regarding the core components of the final idea, based on these study results and former defined requirements the following concept is created.

'Eri-tool is an interactive smart app, for Ericis project management, which requires specific input on the projects which are to be defined in the project plan- and decision documentation templates. From this input, numerous fundamental elements are generated such as the long- and short term overviews (plannings) of the project process. The user can zoom in and out on the project-phasing overview, as much as preferred or required. The application also contains personal pages, project pages and an archive which offers the users a continuous learning process.'

The Eri-tool is an application which guides, supports, enhances and optimises the process and projects management by not only facilitating the management process however also by accommodating the required fundamental elements to perform to full potential. This application is designed to solve rooted problems and to create a seamless management process through the solutions which are an integrated part of this tool.. Throughout the final embodiment phase, the final usertest was conducted with a created click-through app prototype which represented the concept design as good as possible.

Within this graduation thesis you will be taken through the entire process from the challenge to the solution.

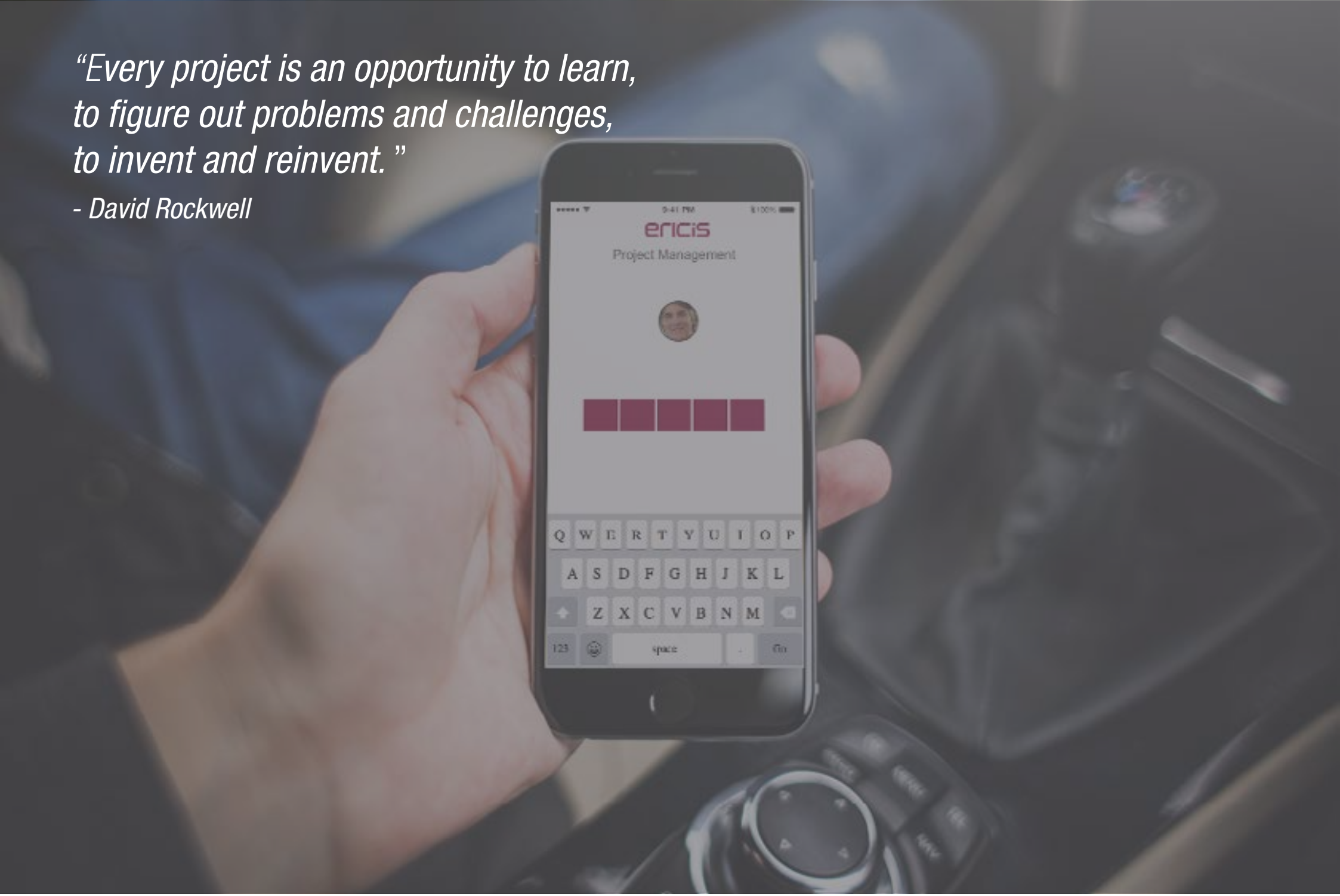
"Design is directed toward human beings. To design is to solve human problems by identifying them and executing the best solution."

- van Chermayeff

CONTENT

“Every project is an opportunity to learn,
to figure out problems and challenges,
to invent and reinvent.”

- David Rockwell



CHAPTER ZERO
INTRODUCTION
0.

The following chapter will introduce the reader to this project through the extensive provided information on the design challenge and the scope of this project in general.

0.1 INTRODUCTION

the start of it all

Over the past five years I have been developing into an Industrial design engineer. I always envisioned becoming a diverse engineer which is skilled on several levels. I aim(ed) to develop a skill set that can be applied to different types of challenges and assignments on both a technical as a strategic level.

Within the five educational years I've had at both the Technical University of Eindhoven as of Delft, I have chosen not to immediately specialize myself in a certain domain, but to develop as such that I am able to function as a design engineer in several types of domains.

I have had a vision for my graduation project to dive into a new domain and into a new type of design challenge. I was looking for a challenge which did not have a strong focus on integrated product design however more so on strategic design. Personally, I find all these disciplines similar to one and another and intertwined within each other, and therefore I have always worked to develop my skills as broad as possible. Every phase of a design process affects another and by developing on these different levels, a larger insight, from a design engineering perspective, is developed.

I aimed to find a company which faces an organisational problem or challenge however lacks the knowledge, time or capacity to solve this.

Ericis project management, a real estate development organisation, is the exact company I was looking for. I immediately asked whether there were any sort of difficulties they cope with which they have not been able to solve. This organisation copes with numerous difficulties which were not necessarily seen as a problem or challenge however these difficulties were prominent in the organisation to the extent where the team was aware that action had to be taken.

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Based on the difficulties that the team faces, the following design challenge is created.

'Develop and design a tool that facilitates the management of the project process as well as the management of all running projects.'

This design challenge is to be tackled and answered at the end of this project by conducting a thorough design process. Within this thesis you will be taken through the entire design process, from research to a final design.

0.2 COMPANY

the assigner: Ericis b.v

Ericis b.v

Ericis b.v is a dynamic organisation that provides all-round consulting and services in real estate (Ericis ,2015). The real estate organisation is founded by Donald Dinkelaar who is a Tu Delft graduated engineer. For over twenty years Ericis b.v is a part of the real estate industry (Ericis ,2015). The organisation executes on A level and delivers their products and services on that level. Good isn't good enough for this organisation, they strive for perfection in order to deliver excellent products and services to their clients. The organisation consistently delivers these premium products due to the fact that they consistently challenge the status quo. The creation of these excellent products and services is due to the core values of the organisation which are the foundation of the internal activities.

These core values of the organisation are: sustainable innovation, optimal quality and independant sparring partner (Ericis ,2015).

Sustainable innovation: "Within Ericis we always think big with a futuristic vision in which we always perform innovative and sustainable."- (Ericis ,2015)

Optimal quality: "Good isn't good enough. we aim for perfection by offering tailormade and full service consults."- (Ericis ,2015)

Independant sparring partner: "We create a long-term relation by always runnning the extra mile. Our work domain is limitless. Next to the Netherlands, we are run project within Curacao, South-America and the Middle-east."- (Ericis.nl,2015)

Figure 1. Ericis b.v location

Figure 2. Park management

The organisation exists out of three departments in which different services and products are created and provided; Ericis real estate consulting and design, Ericis park management and Ericis redevelopment.

Ericis real estate consulting and design, exists out of a team of real estate consultants and designers. The team is specialised in transforming under-developed real estate into valuable and sustainable real estate.

The transformation, see figure 1. and 3., involves all aspects of the estate, from the infrastructure to the look and feel. The type of real estate varies from offices to stores. The exact transformation differs per project since this depends on the estate and the clients wishes.

Ericis park management, see figure 2., facilitates the organisation and sustainability of work locations (Ericis,2015).

Ericis re-development, develops real estate with the following elements as the foundation of each project; architectural excellence, multifunctionality and sustainability (Ericis,2015).

EPM department

The consultancy & design department is together with the re-development department the project management department. These are two theoretically separate departments can be regarded as one department in practice. These departments exist out of the same managing team and similar procedures. Other than the difference in content there is no practical distinction between the consultancy & design(transformation) projects and the redevelopment projects. This EPM department is the scope of this graduation project.

0.3 COMPANY SITUATION & ASSIGNMENT

the design challenge

The EPM team is quite small and exists out of approximately five employees with each a different role. The team exists out of two project managers, two project assistants, an architectural engineer and a designer. Each of these individuals are very different from one another in regards to not only age and background however also skill level and way of working.

The CEO drives the team however does not want to be seen as a part of the team. This team is relatively small for the large amount of projects that they run(approximately ten). They strive for excellence (according to the company's vision) within their work and products. Their performance therefore has to be in line with their aim: excellence. Although the team has conducted numerous successful projects, their project management is not.

Due to the lack of a clear method or guide, there is no coherence in the project management. The increasing amount of projects require a growth in capacity. The team is recruiting potential candidates that can join the team. It is quite impossible for the team to explain or describe their exact project management process due to the fact that there is no clear standard process.

The increasing amount of projects require a growth in capacity. The team is recruiting potential candidates that can join the team. It is quite impossible for the team to explain or describe their exact project management process due to the fact that there is no clear standard process.

The increasing amount of projects also requires a clear process overview in order to manage all projects simultaneously. When coping with merely a few projects a process guide is not quite necessary because there is a clear overview, however when coping with numerous projects there is less of an overview and a guide is required.

In order to create clarity regarding the specific EPM process, its activities and products, the following assignment is proposed:

"Develop and design a process book in which the entire project process from acquisition, design, construction to completion is compiled. This process book is aimed to be used as a guide for future projects." - Donald Dinkelaar

Based on further elaboration on the assignment and on what exactly the team wants and needs the following reformulated assignment is defined:

'Develop a tool which facilitates the management of the project process as well as the management of all running projects.'

Figure 3. Offices developed by EPM

0.4 APPROACH

the plan to solve the challenge

The aim of this project is the creation of a tool which facilitates the management of the project process as well as the management of all running projects. In order to develop this tool a design process will be conducted. The users of the final product, are the employees of Ericis b.v., in specific Ericis project management. Their input is essential for the success of this project. Therefore, throughout each phase the users will be included in the process. Dependant on the phase, there will be more or less involvement.

- Within Phase I.; Research & Analysis, the users will provide internal information which will be retrieved throughout the internal research.
- Within Phase II.; Idea Generation, the users will create ideas themselves throughout the ideation sessions.
- Within Phase III.; Concept Development & Design, the users will be involved in a user test which is based on the so far developed iterations of the concept.
- Based on their feedback, the tested part of the concept will be optimised.
- Within Phase IV.; Embodiment, the users will again participate in a user test however this test is based on an embodied prototype which is also an optimised version of the concept. Based on this final feedback provided by the users on the prototype, the final improvements and adjustments are implemented. Next to this, there are also recommendations developed in which the further required optimisations and developments are defined. The final prototype testing is the most essential one for all involved parties because this shows the status of the tool and the required further steps.

At the end of each phase the users are presented with the findings and conclusions of the conducted work and with an overview of the following phase. Based on their feedback and input, modifications are made to the conclusions.

Intro & Phase I - Research & Analysis

In order to create a tool that suffices to the given assignment and so provide a solution to the problem; a thorough design process is required. Internal, company, information is gathered based on interviews, participation and observations. This internal research is required in order to analytically discover the core problem which lies within the given assignment.

It is assumed that the core problem is one beneath other smaller problems. Due to the assumption that the problem is deep rooted, an extensive observation process is required. It is also assumed, that because of the complexity, more than one underlying problems might be found.

The core problem will be retrieved from the mentioned internal research, however the solution will stem from the literature research, ideation and conceptualisation. The literature research refers to existing methodologies, literature etc. It is assumed that within the existing literature, possible elements of the solution or certain strategies to find the solution, can be derived.

Both researches are conducted on different moments in the project. At first the internal research is conducted and once the core problem is identified, a more specific, literature, research is conducted. By doing this the studies optimally enhance each other.

Once the design brief is developed with a: problem statement, positioning statement and conclusions of the researches, the idea generation phase of the project starts. Within the first phase, data is collected and analysed to the extent that it is clear what exact functionalities and properties the final result should deliver in order to suffice to the need and or solve the problem, this will be foremost formulated in the positioning statement.

Phase II - Idea Generation

The idea generation is the second phase in the design process. The ideas are generated based on the application of methods. The specifications of these methods are to be determined once the design brief is created. The aim of using methods is in order to gain an optimal result within this phase. Each design project, requires different types of methods due to the fact that each assignment contains a different scope and challenge. The source of these methods will be the ‘Delft Design Guide’ and possibly other sources of the same or similar academic level. The aim for the final idea is for it to suffice to the design challenge and for it to fit the organisation. It is assumed that a combination of very different but also very similar types of methods will be used. This is due to the fact that the assignment is extremely complicated and challenging. Therefore generating ideas in merely one box will not provide the required solution that will suffice to the design challenge.

Phase III - Concept development & design

Within the conceptualisation phase the final defined idea will be developed into a specific, production-ready, concept. Within this phase another research & analysis will be conducted however with the specific scope of this idea. This is required in order to define a thorough and detailed concept. Within this phase; sketches, flowcharts and iterations are made all regarding the concept design and development.

Phase IV - Embodiment

The final step in the design process is the embodiment phase. During this phase the concept is embodied into an actual product, service, document or else which is aimed to answer the challenge for the consumers. This phase leads to the final result of the project. The aim is to conduct a user test with the final prototype which following can be improved based on the users feedback. Recommendations regarding further required developments of the model are documented. Finally, an implementation plan is defined on how the implementation should be executed for an optimal integration between the tool and the organisation. This design project is finalised with a conclusion and a reflection.

"User-centered design means understanding what your users need, how they think, and how they behave and incorporating that understanding into every aspect of your process."

– Jesse James Garrett

CHAPTER ONE

PHASE I

RESEARCH & ANALYSIS

1.

Within this first phase of the design process, thorough and fundamental studies are conducted in order to discover the underlying core problems of the design challenge and the design requirements to solve these.

1.1 INTERNAL RESEARCH & ANALYSIS

discovering the core problems

Introduction

Ericsb.vassignedthedevelopmentanddesignofatool whichfacilitatesthemanagementoftheprojectprocess as well as the management of all running projects. In order to provide the team with a tool that will be an useful guide throughout their entire project process, it is required to discover and define the core problems or needs behind this assignment to thoroughly approach the design process. These underlying needs are the root and cause of all the inconveniences the team copes with, without solving these, the tool will be useless. Therefore the research question of this internal study is as following:

What are the core latent needs to the given assignment?

In order to answer this research question, three specific methods will be applied of which each is aimed to retrieve slightly different types of information. By researching and analysing multiple perspectives, the symptoms of the core problems will overlap each other and can be grouped and defined. The first method is an interview, this interview is aimed to be an orientation regarding the perspective of each team member's personal experiences, obstacles and expectations all in the context of this assignment.

Following the interview, the observation and participation studies are conducted simultaneously (parallel). The participation research is aimed to retrieve information on a deeper level which is on the inside of the team. The aim of this participation is to discover symptoms which are only encountered when executing an activity or so.

The observation research is applied in order to gain deeper knowledge and data on the problem symptoms and any other notable situations etc. Through the observation, problem symptoms are expected to be retrieved which the involved users have not noticed themselves.

The core problems are not expected to be easily discovered. These are at the root of the WW, see Figure 4. ,and not visible on the surface which makes it a challenge to retrieve them. The applied research methodswillnotallexplicitlyshowthecoreproblemsbut most likely will show the problem symptoms of these.

The problem symptoms are several types of smaller problems which are manifested in the organisation. Individually these problem symptoms seem innocent however the numerous manifestations are not coincidental, most are descendant from the core problems. Tackling the problem symptoms will not solve the core problem and therefore the symptoms will remain manifesting in the organisation. One of the most prominent challenges in this project is to retrieve the problem symptoms and through these discover and define the core problems which are at the bottom of the iceberg and basically the cause of all difficulties the organisation encounters.

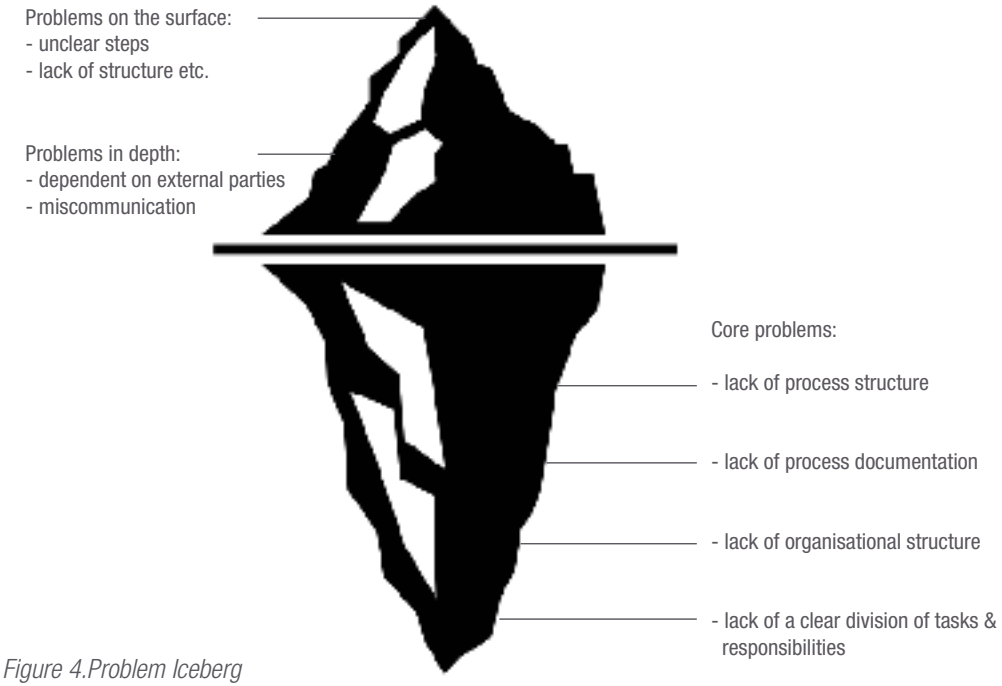

Figure 4.Problem Iceberg

Description of the methods

The interview is a conversation with each member of the team in which the user is open to express current problems, obstacles, experiences and preferences all in regards to the assignment. This method provides extremely valuable information due to the fact that it is retrieved from the user who is the closest involved in the execution of the project. However the same user who has all this information, is also subjective and most likely to have a blind spot regarding some of the existing problems and or needs.

The project assistance requires the involvement of the designer as a part of the team, which places the design student in a similar position as the user. The designer faces the actual: experiences, situations, obstacles etc. By assisting in a project the designer basically becomes a part of the team and conducts this study from another perspective.

The observation method is basically watching from a distance to what is happening on a daily basis. The designer is not involved in any of the activities etc. In this way the designer is objective and like a 'complete' objective outsider.

Internal research methods & results

1. Interview research

This interview is a company and assignment orientation. This orientation is not only required in order to discover the core latent needs of the assignment however also to comprehend the verbally communicated assignment description and the users' their expectation and preference on the final result of this project. The initial assignment description was of a specific final product and did not include what this product has to offer the user.

An interview is a research method through which insights can be gained and understanding can be expanded. An important aspect of the interview was the formulation of the question, which was aimed to be open enough to not restrict the user but closed enough for the user to understand what exactly is asked, and the way of communicating the question.

The interview questions were largely formulated in order to give the user as much freedom as possible in answering the questions. The interview was aimed to be short, to the point and focused on a specific subject.

It was expected that the content of each of the interviews differed due to the different roles within the team, this however appeared untrue.

It is assumed that due to the large extent to which the team works together, quite the same type of answers were given by the project development team.
This also indicates that there are no strict and specific work activities or positions connected to one specific employee, for example the architectural designer answered the questions strikingly similar to one of the project manager's. Both have a different position within the company however give similar answers, this could be regarded both positive as negative. On a positive note this indicates a close cooperation within team however this most likely also indicates a possible lack of individual independence of each team member.

The following questions were asked to each user. These questions are stated as such that the users are able to express the existing problems which they experience together with their expectations and wishes. Through these questions a perspective is created on what needs to be achieved in order to suffice to the users their wishes.

- *What are the problems that are underlying to this assignment and organisation?*
- *What do you expect from the end-result and how do you want or expect to use it in the future?*

The questions received multiple similar answers from the users which are following quoted per subject. Read the entire interviews in Appendix C.

1.1 INTERNAL RESEARCH & ANALYSIS

Interview research

What are the problems that are underlying to this assignment and organisation?

Read the entire interviews in Appendix C

Lack of a solid long- and short-term vision

User quotes from the interview

"There is a need of both a long- and short term vision. Work activities are determined on a short term, the tricky part of this is whether these activities will fit into the workdays of the employees."

"We often work with short term plannings. First we finish something and when its finishes we think further. I think that it would be useful to create an overview of the project process from start to finish."

The users indicate that there is no clear vision over the course of an entire project. Step by step the exact activities are defined however it is not possible for them to precisely describe what exact activities are to be conducted in ten or even two weeks from now. It can be assumed that certain difficulties which they cope with could have been prevented before the it was manifested however without a precise vision on what is to come, there is no insight on the crucial aspects.

Lack of a method (work structure)

User quotes from the interview

"We don't work according to any type of method, what's in Donald mind is basically our method.'

'We work according to what's in Donalds mind, Donalds method."

"he need of a tool comes from the current lack of a clear general process. There are no methods according to the fact that this is a small company and we are all experts so everything is conducted from the top of our heads."

"The problem lays in the lack of overview. I think that it would be useful to create an overview of the project process from start to finish."

Another problem that the users express is that there is no explicit method or work structure that accommodates their project management process. Methods within project management are aimed to support the process, increase the efficiency and optimise the quality of a project.

Methods are often fundamental success formulas based on which organisations create their products however when an organisation does not have this consistent fundamental formula they don't have a grip on their own process. This lack of a work structure creates risks, insecurities etc.

This information contradicts the success of the organisation. Somehow EPMdoes have that success formula due to which each of their projects turn out as a success. This fundamental formula of the organisation is the CEO. The CEO, as stated by the users, has an implicit work structure in his mind based on which the team performs. Due to the fact that this is an implicit work structure it is not clear for the team what the exact structure is. Although the CEO guides the team, he is not a member of the team which means that most of the time they work without him. Those are the moments when they encounter difficulties etc. because at those moments there is no 'implicit' method.

Lack of clear process documentation

User quotes from the interview

"A reflection on whether a project has been conducted either good or bad. is currently not possible due to the lack of any sort of documentation. This also makes it hard for other departments such as finances to keep track of the project process."

"There should be a documentation of the arranged appointments with clients and other external parties."

"As the financial department I experience that there is no overview on the actual margin of the projects. There are revenues and costs and these are balanced by Donald however essential elements such as the exact hours the employees make, additional work and all other remaining costs are not involved in this balance."

Another described problem is the lack of documentation on the projects. There is no documentation on what happens within the projects which makes it difficult for other departments to keep track of the projects. It also makes it hard for the team to reflect and develop from prior experiences. The team might learn from some of the most prominent situations however there are multiple things that happen in a project from which the team can learn and develop. At the actual moment a situation or activity might seem irrelevant however at the end of the project or three projects later this might have been an essential learning experience. Next to the aim of finalising successful projects and creating revenue, it is important to learn from every project and improve from it, in order to develop even more fruitful projects, an increase of revenue and foremost an improved project process. It all comes down to the fact that the documentation of a project process is more valuable than it initially seems.

Unclear task divisions

User quotes from the interview

"There is no clarity in regards to when what has to happen. Who conducts what tasks, there is an absence of a clear task division. Currently everyone is all over the place and there is no clarity on who carries which responsibilities"
"It's often unclear who is doing what and that's something we are trying to improve now."
"I think that the problem lays in the lack of overview."

A clear task division is missing, both internal as external. Who does what within Ericis and who is the external contact person? To who should what be communicates and what are the relations in general.'
"I think that it would be useful to create an overview on the task division within Ericis and an overview of the external partners."

The users indicate that there are unclarities regarding who exactly performs what tasks and what it is everyone in the team is working on. This is very interesting problem due to the fact that EPMis a relatively small organisation, of which could be expected that there are very short and direct lines apparently this is not the case. The tasks and responsibilities of everyone are very unclear, as described by the users, which could be caused by the lack of communication and or transparency. When there is a lack of communication people don't make an effort in informing and updating one another on the actualities. While when there is a lack of transparency the users don't share everything with each other and consciously withhold certain information from each other.

Shortage of staff

User quotes from the interview

"There is a shortage of staff to handle everything however once there is more staff there will automatically be more structure."
"We are growing in staff and in projects"

The final problem that the users define is the shortage of staff. The six project management employees are not able to cope with the increasing amount of projects which causes organisational problems, therefore the team is actively recruiting. The large number of projects and the small number of employees are, according to the users, a cause of the lacking structure.

The answers of the users to the first interview question can be concluded as following:
The problems that are underlying to this assignment and organisation are the lack of a short- and long-term vision, the lack of a method and work structure, the lack of process documentation, an unclear task division and a shortage of staff.

1.1 INTERNAL RESEARCH & ANALYSIS

Interview research

What do you expect from the end-result of this project &
How do you want or expect to use it in the future?
Read the entire interviews in Appendix C

Clear project process steps

User quotes from the interview

"Clear and visible steps and milestones."
"A process overview on paper and not merely in everyone's head."
"There is a lack of a clear overview on the activities in regards to the time due to which there is a very short-term vision in which there is a focus on the current activities and the following activities will be following discussed. There is no overview on the entire process but merely on the current step."

The users aim for clear visible steps of the entire project process from start to finish. According to them these steps are not explicit defined anywhere, due to which information on their process phases can't be retrieved from anywhere. In the prior question they have mentioned this as one of the causes of the lack of a method and work structure. The team aims to create a work structure with a clear defined project process. This defined project process is intended to create more structure throughout their daily activities and in the projects in general. Also a shortterm and longterm vision is created through the clear process, because the team is able to simply refer to the project process and apply this to the project at hand. It is assumed that currently the long-term vision is missing due to the time it would cost to create this extended vision on the entire projects. Therefore there is more of a week to week vision.

Based on the experience and expertise of the team, they are able to run the projects without any supporting material however now that the workload and projects increase this become more of a challenge and their project process becomes more valuable. By clearly defining the project process there is a point of reference throughout the management of the projects. It can be assumed that the unclear aspects regarding the work structure largely decrease.

Process book

User quotes from the interview

"A processbook with procedures and work instructions.'
'Draaiboek moet in principe gegeven kunnen worden aan nieuwe personeel, die weten dan hoe een process gaat."
"The possibility should be there to give new employees a processbook which informs them on the project process."
"A Processbook and a process planning"
"I hope that a method to plan projects will contribute to the velocity and ease with which we conduct the projects. Hopefully it will also prevent frustrations, miscommunication, rushed activities etc."

The users aim for a processbook or any sort of method which may facilitate and accommodate their project management. This method should prevent difficulties such as miscommunication, a lack of time etc., which the team currently encounters.
It is aimed for this processbook or method to exists out of the Ericis project process which creates a clear procedure for everyone in the team. This idea is foremost based on the prior mentioned lack of method and word structure.

Project process documentation

User quotes from the interview

"Maintenance of an archive and standardization in documents"
"I think that the cooperation between finances and project management can be optimised. I think that it would be useful to include finances more into the projects in regards to the creation of the quotations etc. so I can start the invoicing. I have little to no insights on what happens and in what phase they are which refains me from performing any action. The more of an overview there is, the more I can involve myself where it is required and indicate whether there are is an overload of hours or costs."

One of the mentioned problems by the users was the lack of documentation. They aim for standardised documents and an archive with all these documents. Currently the documentation that they have are meeting notes which are all different in regard to the structure of the documents. This is due to the fact that every project manager structures these documents in a different way which eventually creates different types of documents of the same sort, which creates more unclarities to the already chaotic work structure etc. Therefore the team aims for standardised documents, one format that is applied to every meeting etc.

These preferences and expectations that the users describe are essential for the entire design process in order to suffice to the assignment and the users their needs. From the final product is expected and aimed that there are clear project process steps defined, a process book with a clear procedure and accommodation of standardised project process documentation.

Interview conclusion

The conducted interview research resulted in numerous problem symptoms and a clear overview of user wishes and requirements to which the final tool should suffice. see figure 5. The requirements are as following: work(process) structure, project process documentation, clear division of tasks (responsibilities) and one general method. These requirements are connected to the problems and basically should solve the problems.
Next to this interview, throughout multiple moments similar questions were asked to the users in order to discover possible other needs or problems that were not mentioned throughout the interview however all information came down to the above four points. The discovered problems can be regarded as the ones at the top of the iceberg.

The following quote of one of the user's, perfectly describes the problems on the top of the iceberg.
'De problematiek zit hem volgens mij in het gebrek aan overzicht. Een duidelijke rol/taakverdeling ontbreekt vaak zowel intern als extern. Wie doet wat binnen Ericis en wie is het aanspreekpunt extern? Naar wie wordt wat gecommuniceerd en hoe zijn de onderlinge verhoudingen? Ook werken we vaak met korte termijnplanningen. Eerst iets afmaken, dan pas verder denken. Ik denk dat het nuttig zou zijn om inzichtelijk te maken hoe de stromen lopen van begin tot eind van een project en hier een duidelijke planning voor te maken met taakverdeling en deadlines. Zowel een taakverdeling binnen Ericis als een overzicht van de partijen waarmee wordt samengewerkt. Structuur in documentatie van gemaakte afspraken met de opdrachtgever, andere betrokken partijen en aannemers.'
- Pien Laumans (former EPM assistant)

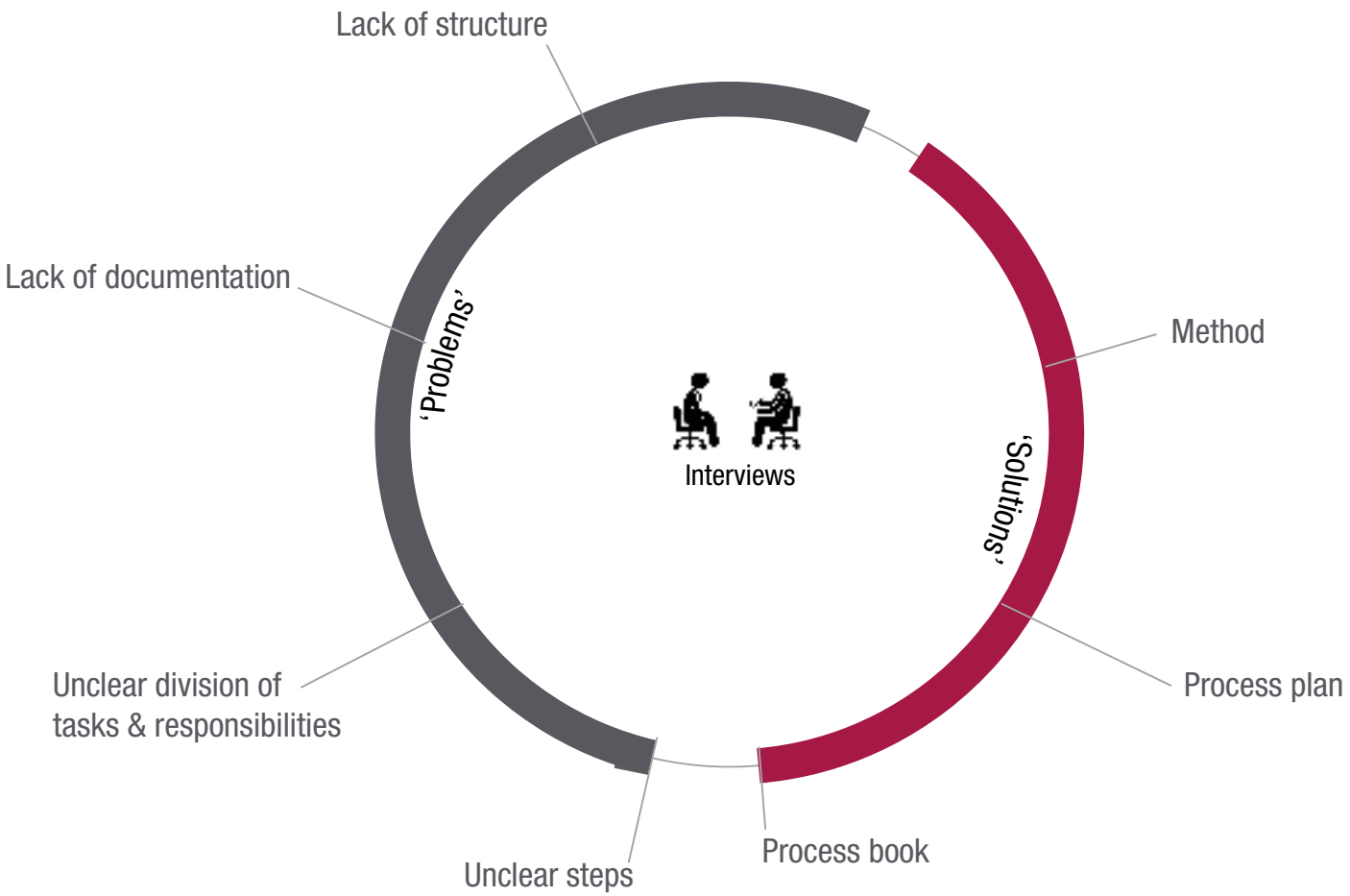

Figure 5. Schematic interview research results

1.1 INTERNAL RESEARCH & ANALYSIS

Participatory research

2. Newtonlaan project participation

One of the research methods is an actual active involvement in one of the projects, the participatory research. This participation was in a small assisting role. Through this participation there was a closer look on what really happens and takes places in one of the project phases.

The involvement in the 'Newtonlaan-Achmea' project was by documenting the meetings. The documentation was more of an administrative way to clearly document the discussed future actions, decisions and announcements. The aim of this study was to zoom into a specific project next to all the observational and distanced involvement. When being actively involved in something you experience everything in a different way and you see aspects which you would not be able to see on a distance.

Other than all the projects which are studied within the, simultaneously running, observational research; this project is well structured and organised with respect to the external parties as to the internal organisation. This project assigned by Achmea is a project which is largely discussed throughout the team meetings and on a daily basis there are numerous activities and dialogues conducted surrounding this project. It can be assumed that the time and effort invested in this project is due to the importance of it, which in this case is based on its size and the revenue it will create. The Ericis organisation is overly occupied due to the numerous projects that they run, therefore not every project can be given equal time and effort on a daily basis.

The Achmea Newtonlaan project definitely was a priority project. This was a very large project with several involved parties: Achmea which is the client and the building owner next to the owner there is also the building management and several tenants which are all prominent factors within this project, further in the project process contractors, advisors etc. also became important parties. Communication and cooperation were essential aspects in this project. EPMwas well aware of the complexity and size of this project and therefore invested a lot of time and effort to have a structured process.

External influences: impotence

Manifested problem symptoms

- *Encounter with the multiple parties which are all involved in one project. Dependant on others e.g the client to make a decision.*
- *Achmea delivers to Pwc and Cms delivers Achmea.*
- *ER requests and checks quotations from third parties. Once these are approved they are transferred to Achmea who executes the payments.*
- *Ericis searches for alternative furniture based on the prior determined pieces.*
- *Achmea informed PwC and CMS that all appointments and approvals are executed through Cushman & wakefield. Ericis would like to receive the drawings from Cushman & wakefield which they receive from other parties.*
- *The construction licence is declined by the municipality which means that the design has to be altered.*

Although Ericis invested extraordinary time and effort to create a seamless project process, there are always external influences which could not have been prevented.

Within such a large project, decisions can not just be taken by one party but this has to run by all the authorised parties. This creates a constant dependence on other parties throughout the project process because certain decisions need to be approved by others and certain information needs to be provided by others. This at times causes a work delay for EPM which prevents them to proceed with certain steps of the process.

Another interesting problem that occurred was that the requested construction license was denied by the municipality. The design of the entrance had to be modified in order for the construction to be permitted. This news was not expected by the parties and caused quite a stir because the designs had to be modified within a short time frame otherwise the entire construction planning, which involved three large companies, would have to be rescheduled and considering the involved companies, investments etc. this was not quite an option. EPMdeveloped the designs based on the designs another architectural firm had created. It was assumed by Ericis that this company had already requested the municipality for approval of these designs and they expected the license to be provided. t appeared that the prior responsible company did not run the sketch designs by the municipality while they should have and because of this, a lot of time was wasted and more time had to be invested in the design of the entrance.

Project participation results

This final study showed problems which are quite different from the once retrieved throughout the other two studies: dependence on other parties regarding: the transfer of information, specifications and consent on specific aspects of the project, see figure 6. This dependence on other parties might not be seen as an actual problem however when regarding the influence of this on the project process and it quite a problem. It can delay the project's process which can conflict with the processes of other projects and so lead to internal problems. This study has also shown some outstanding qualities of the team on which will be elaborated further in this report.

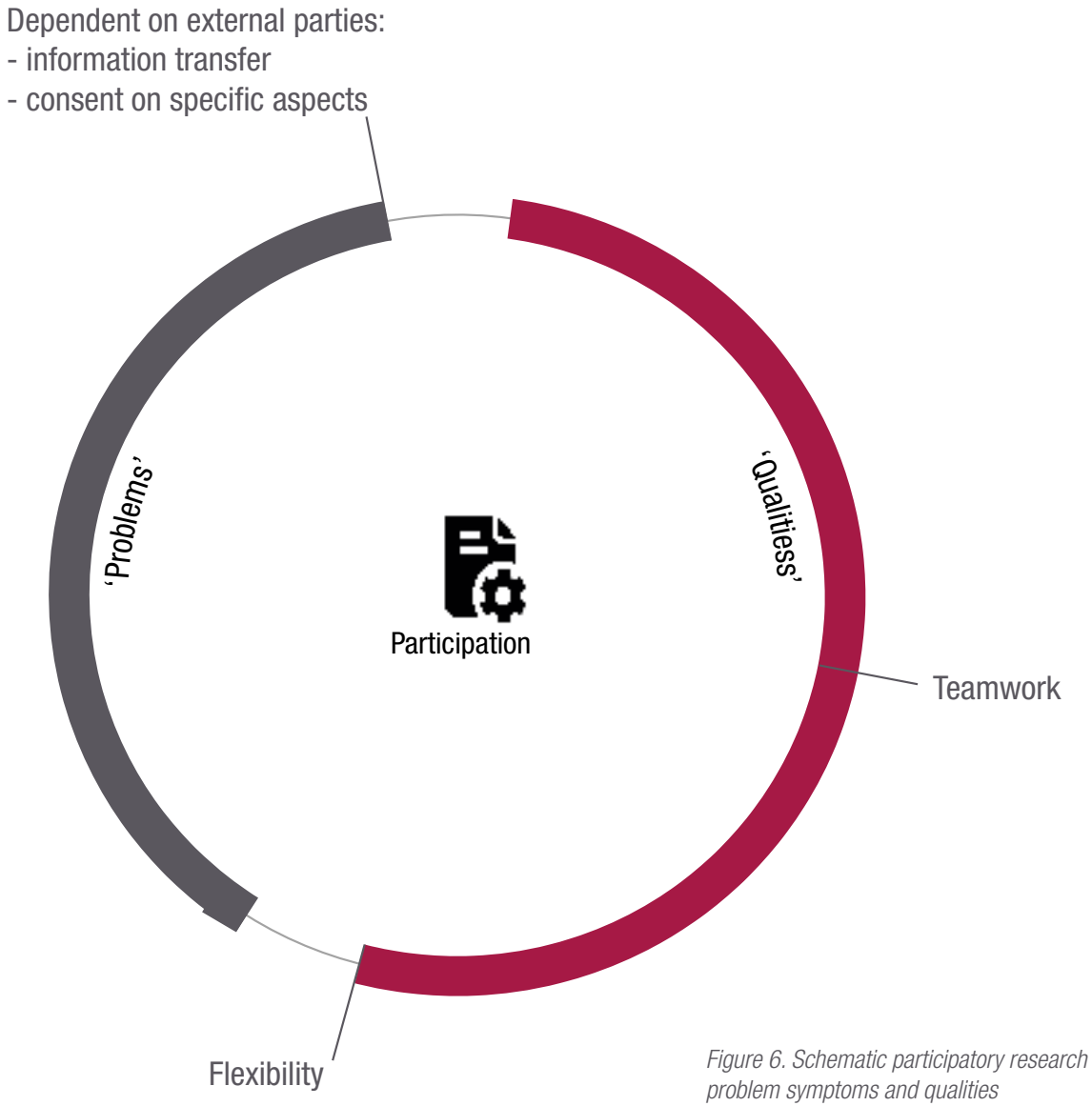

Figure 6. Schematic participatory research results: problem symptoms and qualities

1.1 INTERNAL RESEARCH & ANALYSIS

Observational research

3. Observation research

The aim of the observation research method was to find more underlying problems. This study is conducted over 5 weeks. Observational research is done by observing behaviour and situations in the natural setting (atlasti, 2002). The users: the EPMteam conducted their day to day activities as they always do and the student joined them without interrupting their activities or whatsoever. The student merely observed the activities, actions, meetings etc. of the team. On a daily basis the team splits due to the fact that most of the time everyone is working on different subjects which at times requires them to be at different locations. The company mentors decided where and who the student should observe. This decision was made based on what they regarded as an interesting meeting or event in which valuable topics etc. are to be discussed.

The observation was conducted throughout eight of the running projects, the other approximately two projects were in either the acquisition or after care phase. Each project was different due to the difference in location, assignment, project manager, client, external parties etc. Some projects had the same assigner, external parties etc. however in general the projects were still different. Therefore the discovered problem symptoms were very different as well which made it a challenge to discover the underlying problems since these are manifested in several different ways.

Both meetings with just the project management team as meetings with external parties were observed. During the observations it was important to focus on every subject discussed no matter how irrelevant it might seem for the study. The body language and responses of people were important as a person's behaviour expresses a lot and sometimes expresses more than their words. In this study there was no specific focus on merely one aspect however there was more of a helicopter view on all aspects in order to discover several problem symptoms and not merely a view expected problem symptoms.
The extent to which the team actually elaborates on the joint (with all involved partners) discussed and required changes in their work, shows how important and relevant the concerning project is for them (Ericis).

The observation provided a lot of information regarding all running projects and involved partners, which showed more problem symptoms than merely the ones mentioned in the interview. These problem symptoms were to be found indirectly. During the observation every thing that even slightly might have been interesting was documented however the obvious irrelevant (for this study) aspects were not documented.
What are the core latent needs to the given assignment?.

The observation is another conducted study in order to discover the answer to the research question; the core latent needs to the given assignment. This study showed very different results from the other studies. A lot of very different situations occurred which is due to the fact that this study involved numerous projects with each a different content and different people etc.

Discovering the actual problem symptoms was hard due to the fact that a certain problem might occur within a situation however this problem is not necessarily a problem symptom of a core problem. This could be a problem which occurred due to external factors which the team couldn't have prevented. Especially because throughout the observation within the different projects there numerous different external parties with which each the cooperation is different, so not every retrieved problem is due to a core problem within organisation.

External influences: impotence

- *Manifested problems*
- *Delay in project construction due to asbestos - project:Tribes Coolsingel*
- *Contractor is behind schedule - project:Tribes Coolsingel*
- *Last minute design changes assigned by the CEO - project:Tribes Zuid-as ITO*

Within this observation several manifested problems were discovered. The problems which are actual problem symptoms are the ones which are essential for this study. However, there are also other problems such as the ones which are caused by- and under the responsibility of external partners. The external caused problems are not manifested within the direct activities of Ericis, however in the activities of the responsible parties.

The project; Tribes Coolsingel, suffered a delay in foremost the construction phase due to asbestos in this concerning building. Although this is not directly caused by any of the parties, it is a problem which is manifested in the building which is under the responsibility of the building owner.

At first this might not seem a problem for Ericis, however due to their responsibility to complete this project, this indirectly is a problem for them.

The project activities which Ericis has to conduct, such as creating designs, technical drawings, quotations etc., all can be done regardless of the asbestos problem of the building. However, once the construction phase has to start as planned and the building is not free from asbestos this becomes a delay for Ericis. This situation shows how, regardless of the core problems, external problems can be internally manifested due to impotence. Eventually there was an extension of the completion date.

Another, rather odd, manifested problem was due to the impulsive decision making of the CEO. During one of the observations at the construction site of Tribes Zuid-as ITO, the design of an almost finished toilet room was assigned to be modified. The CEO was working abroad and got inspired by a toilet room overseas of which the design fit the concept of this Tribe:X-Tribe. Even within an almost finished construction and the pressure of a deadline this had to be modified.

Lacking or weak communication

Manifested problem symptoms
Weak communication and cooperation (first project together)
Not every team member has the same knowledge of a project as the other. It seems like not every member is sufficiently informed or familiar with the project. This easily causes a waste of time due to unnecessary questions and answers in dept

The observation also showed multiple problem symptoms of either a lack of- or weak communication. Throughout the majority of the projects, the organisation works together with the same external parties with exception of the clients and building owners. Throughout years of cooperating with these external parties, a partnership has developed in which both partners are aware of eachothers organisation and way of working. These external parties
are acquainted with the Ericis organisation and each employee's role in it, which makes it easy for them to communicate and work with Ericis. Throughout the observations there was a visible difference between the cooperation of Ericis with new external parties and their cooperation with the familiar external parties.

The cooperation between Ericis and the new external parties, progressed slowly due to communication problems. In the project Tribes Blaak for example, there were multiple unclarities between Ericis and the architectural company. Throughout their numerous meetings, Ericis was often represented by different employees, and although the project management department is relatively small, this still led to unclarities between the two parties.

The involvement of every employee of Ericis project management, demands consistent and detailed communication in order to convey all relevant information to everyone else. This transmission of information was not consistently executed which caused a situation in which another employee was not able to answer certain questions or justify certain design aspects to the external party simply due to the fact that this information was not communicated to this employee.

This external party is not acquainted with the organisation and therefore not able to understand what happens inside of Ericis project management.
The lack of communication was also manifested in other meetings. Throughout most of the meetings with external partners such as contractors etc., the majority of the Ericis team, if not the entire team, was present. During some of these meetings there was foremost a dialogue between the project management team instead of with the external parties. These dialogues were sometimes important discussions between the team however at other times these were conversations in which the team informed each other regarding the progress etc. of the project.

The prior example has shown how important these moments are in which information regarding a project is communicated to the entire team, however during a joint meeting with external parties is not the moment to do so. These dialogues between the team showed that they are not all up to date with the progress etc. of the project at a moment when they all should have been. The nature of their teamwork will be elaborated further in this thesis. This situation showed numerous problem symptoms of which foremost; weak communication.

1.1 INTERNAL RESEARCH & ANALYSIS

Observational research

Unclear divisions of tasks & responsibilities

Manifested problem symptoms

- *Insufficient progress in the project process: visible in the technical drawing.*
- *Interior designer meets with a data infrastructure company at the project location: Tribes Brussel. This is not the designer's field of expertise and therefore this meeting was brief and lacked depth.*
- *Weak communication and cooperation*
- *Manager not content with the design of a flex-office: re-design*

The majority of the problem symptoms which are discovered throughout the entire observation are either directly or indirectly connected to unclear divisions of tasks and responsibilities.
During a meeting, regarding the project Tribes Blaak, certain arrangements were made in regards to project activities which were to be conducted by Ericis. At the following meeting it appeared that these discussed project activities were not conducted. There was no visible development in the technical drawings at all which of course disappointed the external party.

The fact that the discussed activities (modifications in drawing) were not conducted is largely caused due to fact that there were different employees present at both meetings. The information of the meeting is either incorrectly or not at all communicated to the other employees. Within this situation it was visible that there is no clear division in tasks and responsibilities due to which this problem was created in the first place.

There is no particular person who is responsible for the communication of this information to the other employees which causes them to have a lack of knowledge regarding any information. Next to this the technical drawing was not modified(the activity) either because this was not communicated or because there was no one responsible or assigned to execute this task.

Lack of information

Manifested problem symptoms

- *Not every team member has the same knowledge of a project as the other. It seems like not every member is sufficiently informed or familiar with the project. This easily causes a waste of time due to unnecessary questions and answers in dept.*
- *Multiple unclarities - too much*
- *lack of documentation on plans however these are requested by the co-party*

One of the prior mentioned problem symptoms shows that not every team member is as informed, regarding certain projects, as the other. This is largely caused by the lack of communication. In order to create clarity and to prevent miscommunication etc, it is valuable for the team to actually start documenting the project process information. By documenting the process there is no communication moment required, which is time consuming, but the project information on the progress etc. is documented and each employee is responsible to read the information in order to be up to date. Each employee is able to take a second look at the information whenever he or she prefers to do so.

The details of the discussed information and project progress is always accessible in a document. This information can be retrieved without one employee bothering the other. This specific work structure, in which information is stored, creates a web of information which is stored.

Extended conversations between the team during a meeting with an external party can be prevented by applying process documentation. The overly occupied employees do not have to constantly communicate information of meetings etc. with each other anymore. Instead, this information has to be clearly documented, which creates a database of project information and allows you to look back at prior steps of a project.

Next to this, by documenting the project information, a clear overview is created on the running projects which is extremely valuable, especially towards the end of a project in which the complexity increases. The unclarities throughout the cooperation with external parties and internally at Ericis will decrease due to the fact that there is a structured database with all the important information.

Observation conclusion

Throughout this study there were multiple very different results. It was quite complicated retrieving the core organisational problems behind some practical or very project specific obstacles. The following problem symptoms were concluded based on the research analysis: *external influences: impotence, weak or lacking communication, lack of information, unclear division of tasks responsibilities, see figure 7.*

Figure 7. Schematic observational research results: problem symptoms and qualities

Internal research conclusion

This internal research was based on the following research question:

'What are the core latent needs to the given assignment' or

'What are the underlying problems to the given assignment.

This study resulted in the discovery of numerous problem symptoms, see figure 7. A lot of the problem symptoms can be regarded as small inconveniences or small obstacles however most of these small problems are due to a larger core problem which causes these multiple symptoms.

The core problems are the invisible ones so to say, each occurring problem is not necessarily the exact core problem however it's the manifestation of the core problem in different types of symptoms. Each symptom is individually analysed however in order to define and discover the actual core problems the symptoms had to be analysed as a whole. This is due to the fact that the internal research phase was merely two months and not every discovered problem was necessarily connected to a core problem. The awareness of the short timeframe of the research was important in regards to the definition of the core problem. Feedback from the users was extremely important in order to discover whether the results were spot on or off. The three research methods provided data on several levels from the visible(conscious) top of the iceberg to the invisible(unconscious) bottom.

The internal research resulted in the following problem statement which is an indirect answer to the research question:

'The core needs for a seamless and optimal project- and process management are: organisational structure, process structure, process documentation and clear task and responsibility divisions. The discovered problem symptoms are each a manifestation of one of these four core problems.'

1.2 LITERATURE RESEARCH & ANALYSIS

discovering the solutions to the core problems

Introduction

The prior conducted internal research, a study inside the project management team, was aimed to discover the latent problems and or needs of the given assignment.
This study resulted in the discovery of the following latent core problems: organisational structure, process structure, process documentation and clear task and responsibility divisions.
With this clear overview of the existing problems the next step is to find the solutions for these problems. In order to discover the solutions to the core problem, another study is conducted which is the literature research. Within this study, the team will not be subject to the research however the discovered core problems will be subject. This study will be conducted through literature.

Research question

What is required in order to solve the core problems which are a lack of: organisational structure, process structure, process documentation and a clear division of tasks and responsibilities?

This research question is subject to a literature study. The literature: Projecten Leiden (Groote et al., 2005), is used in order to find the solutions to the core problems in possible forms of methods, specific procedures etc. (e.g prince II etc). Next to this specific literature, numerous other literature pieces were aimed to be applied in this project however none of the pieces discussed the subjects retrieved in the prior study neither did they touch the exact scope of this project. Projecten Leiden (Groote et al., 2005), was the only literature piece that was a seamless match to this project and the results of the internal study, it also touched most of the required information. Therefore the core focus within this literature research is this dutch literature.

The approach of conducting this external study with 'Projecten leiden' (Groote et al., 2005), is by initially studying the fundamental elements of project management, basically expanding the knowledge on this specific branch. The second step is discovering specific solutions to the core problems.

The literature research is intended to take the problem definition outside of the Ericis scope and into a larger scope of the entire branch of project management. By entering into literature and scientific models: a larger perspective on the assignment and the core problems can be created which visualises the bigger picture on the situation including the problems. With available knowledge on the concerned subject the requirements to solve the problems are retrieved.

Literature research methods & results

1. 'Project management' Literature
The literature: 'projecten leiden' (Groote et al., 2005), goes in on numerous project management topics from the functioning of a project team to project management methods and requirements. The relevant subjects of this literature in the scope of this project were researched and analysed.

Phasing: the solution to the lack of process structure and organisational structure.

Within the literature part on 'phasing, decision making and work structure'- Chapter 5 (Groote et al., 2005), most of the core problems are described, together with their causes and solutions.

According to the literature; in a project where there is no phasing, a lack of structure is caused together with an unclear work division and the lack of grip (Groote et al., 2005). Phasing, is the division of phases in the time order of which they occur leading to a specific result (Groote et al., 2005). The absence of phasing is manifested in several ways in a project, from the activities running through each other to the lack of a coherent work structure (Groote et al., 2005). Several of the mentioned manifestations are retrieved in the internal study foremost the lack of structure which is one of the core problems mentioned in the problem statement. The literature shows that this core problem, which causes numerous difficulties within the organisation, is caused by the absence of a phasing. This also suggests that when a project is phased, the lack of process and organisational structure, together with the caused problem symptoms, are tackled.

Manifested (problem) symptoms of the lack of organisational structure

The team does not work according to a specific method however more based on an implicit method which is, 'in the head of the CEO', as stated by one of the employees in the interview. Therefore, there is no explicit general work structure.

Next to this the CEO is not constantly involved in the daily activities which causes each team member to work according to his or her own experiences and vision. All the final decisions, which are not to be made by the client, are made by the CEO. Due to his expertise he has a vision which is not easy to be grasped by the team which exists out of different skill levels.

One of his skills is that he can gain design ideas etc. from his environment and he is able to translate these into the projects.This however often contradicts with the running activities for example during one of the observations; a design alteration to the bathroom was implemented by the CEO while the project was already in the construction phase and the bathroom was already painted etc., he was abroad for business and saw a bathroom which completely fit the concept of that project. The external party responsible for the construction of the bathroom was not quite happy with this last minute change.

This message from the CEO to the external party was urgent, for obvious reasons, and therefore did not pass the project management team which were to found out about this news through the external party. The final design of the bathroom was finalised way before the construction even started, however this decision was modified regardless. In the given example the modification was based on the CEO his vision however in other situations a decision might be required to be modified. The explicit cause of these types of problems is the lack of organisational structure, however the implicit cause of these problems is the absence of phasing.

Through phasing, a clear overview is created on the activities which are to be conducted throughout the project. This created overview is on both short- and long term which is definitely required because it is indicated by the users, in the internal research interviews, that there is a lack of a proper short- and long term overview. The team's work activities are defined shortly from when they have to be executed. Whether the required time to conduct the activities overlaps with one's official work hours is always the question. Certain challenges might be hard to cope with due to the fact that these are not always expected.

By explicitly phasing a project before it starts, the entire project process is organised and the activities, mid-term results etc. are all defined. This creates a clear overview on what is to come and where the critical points may be. The team is able to optimally prepare for the phases and the tasks can be divided at the start of the project regarding the entire process.

Different types of phasing: Linear, Cyclic or Parallel

There is not just one but there are several types of phasings: a linear standard phasing, a cyclic- and a parallel phasing.

A linear phasing is a phasing in which each phase is conducted and finalised in order. This type of phasing is applied to specific, non complex projects (Groote et al., 2005).

A cyclic phasing is a phasing in which the definition- and design phase are conducted throughout several 'loops'. Following, the project requirements are defined based on which a solution is created. This solution is tested based on the requirements and this process is followed by possible improvements and optimisations (Groote et al., 2005).

The parallel phasing is a phasing that is suited to be applied to complex and large projects. This phasing exists out of sub-project phasings', these are parts of the large project, however parted based on for example a certain discipline, which makes such a large and complex project manageable(Groote et al., 2005). Within these sub-projects a linear or cyclic phasing can be applied because each sub-project requires a different approach.

Dependent on the nature of the project and the complexity of the activities etc. The optimal type of phasing can be chosen. A combination of the phasings is also possible e.g. the parallel phasing exists out of sub projects in which linear- or cyclic phasing can be applied. Based on the results of the internal research a decision is made in regards to which type of phasing(s) is required for the team. The type of phasing is chosen based on its fit with the team's work structure together with its features which have to accommodate: solving core problems.

1.2 LITERATURE RESEARCH & ANALYSIS

discovering the solutions to the core problems

EPM faces large and complex projects which are to be conducted with a small group of employees. Coping with the numerous large projects can be difficult at times partially due to the small amount of employees. These projects exists out of multiple important components which are all prominent parts of the project. Parallel phasing is a seamless match to the current process of the team, the difficulties they encounter throughout the process and the type of projects they run which are large and complex. The Parallel phasing exists out of segment-phasings through which the numerous components are separated and structured into different sections. The difficulty to conduct the complex projects is managed by the parallel phasing.

The internal research showed that one of the core problems is the lack of structure. One of the manifested problem symptoms of the lack of structure is: loose ends. Certain phases are not properly concluded by the team before continuing with the following phase. When none of the phases are finalised with a certain decision there eventually will be a phase in which all the decisions are required and these will have to be rapidly made. Although the project process of this team does not quite fit the lineaire phasing, this phasing is required in order to create the missing structure.

The current Ericis project process, in which constant iterations are made, comes down to the cyclic phasing. It is important to implement this phasing, because next to the discovered core problems there are numerous strengths which should be maintained and improved instead of suppressed. These however should be managed in a structured and different way.

The aim is to improve the project management and performance and not completely change it. Therefore based on both the team their strengths and their weaknesses the following phasings structure is decided. This optimal Ericis structure is an application of all the phasings: linear, parallel and cyclic. The main phasing is parallel which includes sub-projects with cyclic and linear phasings. By applying parallel and cyclic phasings, the team their strengths are enhanced and optimised and some of the core problems(weaknesses) are solved. The linear phasing polishes the project process due to the strict decision points (go or no go).

Further within this project the parallel standard phasing (Ericis project process) scheme is created based on the actual phases and activities the EPM team conducts. This standard phasing scheme (Ericis process scheme) can be used in most of the projects and merely needs to be modified when a project process is quite different from the standard process. This will be discussed in another sub-chapter: the Ericis process scheme.

Decision documentation: solution to the lack of process documentation

There is another fundamental element to project management which is connected to both the prior discussed phasing and the core problem: lack of process documentation. This element is decision documentation.

The decision making process within a project is conducted at the end of a phase after which another phase is entered, this is when the decision documents are created. These decision documents exist out of the developments and results of the concerning phase together with a plan for the following phase (Groote et al., 2005).

Decision documentation is basically a way of storing important information regarding a concerning project. The team aims for a process documentation because it will allow them to retrieve important data when needed and to reflect on their work once a project is concluded or at any other prefered moment. The department's lack of documentation can be a problem in multiple situations such as when an external party requests it or when prior decisions have to be justified in later stages of the process.

Although there is no specific method used within Ericis project management, by documenting the process of the projects; a general structure will be visible and the points of improvement will be visible as well. Whenever the team deals with unclarities etc. they can retrieve the concerning data in the documentation.

The decision documents contain specific types of information such as the concerning decision points, data on the conducted phase and an introduction on the following phase.

At the end of every phase there are decision points, based on the delivered products, which are to be discussed by the project manager and the assigner. The client makes the final decision. These decisions are presented in: decision documents. These documents are the end of the previous phase and the start of the following phase (Groote et al., 2005). The actions and final products of the previous phase are presented in the document as well as the plans and objectives of the following phase (Groote et al., 2005).

Within this document it is also described for each participant within the project what their tasks, responsibilities and authorizations are (Groote et al., 2005). The lack of tasks & responsibilities is also tackled by applying decision documentation.

'By working with decision documents, the project organisation, manager and client are all urged to frequently view the project in its entirety. Not only does this create a clear overview on the entire project process, this also facilitates the communication with the client' - (Groote et al., 2005)

Instead of dealing with numerous uncertainties, the decision documentation accommodates clear communication between company(project manager) and client. Both parties have the same information etc. and are almost forced to study the information at hand, instead of being either focused on a specific part of the project or on the entire project, the parties will have to do both otherwise the decision-making will be very difficult.

Projectplan

Dependant on the project management team at hand, creating these decision documents after each phase might not be a seamless fit with their work structure. This goes for the EPMteam which is a relatively small team with a large amount of projects. There is no time to create entire documents after each phase, however these documents are required in order to solve the core problem: lack of process documentation. In the concept development chapter the solution will be discussed. One solution is the creation of a project plan which is a planning that applies to the entire project process. A project plan is the first decision document which is created after the initiation phase (Groote et al., 2005), within this plan all information regarding the project and the partners is described such as the program of requirements etc.

1.2 LITERATURE RESEARCH & ANALYSIS

discovering the solutions to the core problems

Hierarchical lines: solution for the lack of a clear task and responsibility division

'Shared responsibility is no responsibility.'- (Groote et al., 2005)

The final fundamental element which is relevant for this project is the hierarchical lines.
Hierarchical lines are basically a vertical management structure in which one employee receives a clear task and responsibility from another and also accounts matters regarding the task and responsibility to that same person. This is an ongoing structure existing out of the client, the project manager and the other project executives such as the engineer. The lines are aimed to be created as such that each person's strengths are enhanced and weaknesses improved, each person's position in the lines are based on their skills (strengths and weaknesses) and not based on their likeness or age etc. When the lines are set-up as they are suppose to, there is no confusion as of why one person manages a certain subject or conducts a certain task, it will make sense for each team member, see figure 8.

Hierarchical lines is a organogram existent out of a vertical line structure through which the organisational management is executed, see figure 8. The person at the bottom of the line executes the activities which he or she has agreed with the person at the top of the line and also accounts their work to this person(Groote et al., 2005). The person at the top of the line is the final responsible for the activities conducted by the person at the bottom of the line.

Manifested (problem) symptoms of the lack a clear task and responsibility division

The EPM team is quite small and therefore it could be assumed that every member is aware of what the other is doing however this does not go for this organisation. Within the team of approximately six employees, there is no clarity on who does what nor is there a clear division of tasks and responsibilities. Shared responsibility is no responsibility (Groote et al., 2005) and therefore important aspects such as communication with external parties are neglected.

Throughout the observations for example, it occurred that during meetings with external parties, the conversations foremost existed out of the EPM team instead of conversations between the project management team and the external parties. During these conversations the team was updating each other regarding the project or discussing certain critical points of the project which showed that not every member of the team was as informed as the other.
In general every member of the team does not have to be as informed as the other however in those cases there is a clear role division and there is a project manager which is the one that should be informed on everything concerning the project which is a part of the responsibilities of the manager. However due to this team's lack of a clear division of tasks and responsibilities, there is no strict role division in which the assigned person such as the project manager actually sticks to his or her activities and likewise for the designer etc. Instead each member involves him or herself in almost every part of the project which at times causes confusion etc.

"Any enterprise CEO really ought to be able to ask a question that involves connecting data across the organization, be able to run a company effectively, and especially to be able to respond to unexpected events. Most organizations are missing this ability to connect all the data together."

- Tim Berners-Lee

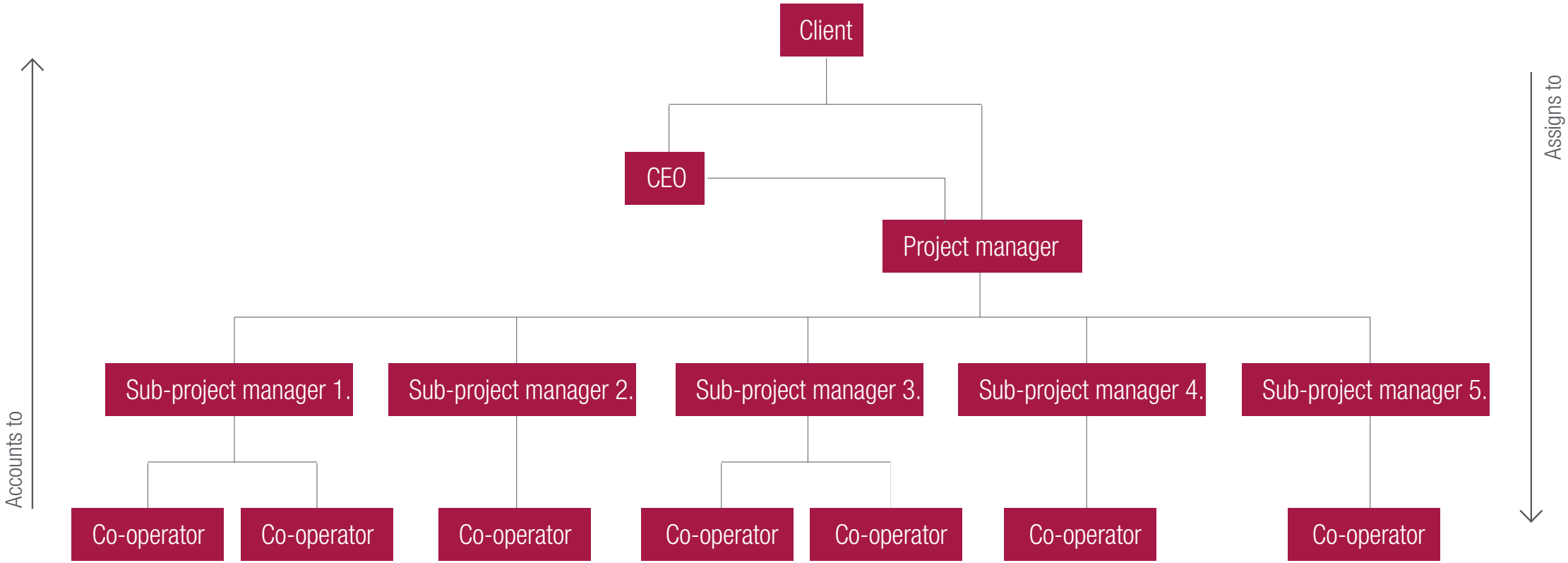

Figure 8. Suggested hierarchical-organogram for the EPM team

1.2 LITERATURE RESEARCH & ANALYSIS

discovering the solutions to the core problems

The team is aware of their individual differences and it is assumed that they compensate this by excessively working together however without solving the existing core problems they can cooperate as much as possible however this will not solve the situation. Even though they work together this much, it is still not clear who is working on what. Due to the lack of a clear task division, communication with external parties, does not always run smoothly.
There is not always an explicit assigned contact person, the external parties see new faces every time and discuss things with one person and that information is not correctly communicated to the entire team etc.

This lack of communication causes multiple unclarities. A striking detail is that the communication problems are visible in the co-operation with new parties. Others parties who have been cooperating with the department for years; are familiar with the team and therefore know how to cope with the team.

Due to the core problem, the lack of a clear division of tasks and responsibilities, no one knows his or her exact role in the team and how to function within that role. A project manager for example is the person who has a distanced control over everything and is informed about everything. In certain meetings such as the 'stuurgroep overleg', de projectmanager is supposed to communicate with the client on all the conducted work for example the work of the designer, engineer etc.

The project manager has an essential role in the project and is the one who always communicates with the clients, within EPM the project managers do not have such a prominent role as they suppose to have which causes the lack of overview on the project etc. Everyone should account to the project manager. There should also be numerous hierarchical lines from who does what to who accounts to who.

By applying these hierarchical lines, see figure 6., a clear structure is created in which everyone is aware of each person's tasks and responsibilities. The hierarchical lines are defined in the project plan. Therefore after the initiation phase everyone's tasks and responsibilities are defined for over the course of the entire project process.

The project manager has an important role both regarding the client as regarding the team. The manager is the one who determines which team member is responsible for which tasks. The project manager is basically the glue between all executives and partners within a project. The manager also has a helicopter view over the entire project. He or she is responsible for the communication with the client or other partners and also for guiding the team in their tasks and responsibilities(Groote et al., 2005). The relation between the project manager and all the other partners and employees is the most important relation in a project (Groote et al., 2005).

'Often it's the indirect signals in the progress of the project. Something that initially seems like a time issue for example an activity which is not finalised in time, this could be caused by an organisation problem, an employee did not know what was expected from him or her and who to account to.'- (Groote et al., 2005)

Project management methods

The literature: 'projecten leiden', does not only contain information regarding the cause of the core problems and how to solve these, however also regarding several existing project management methods. The literature elaborates on the methods: Prince2 and PMBoK, due to the fact that these are generic methods which are not connected to a specific branch, content, phasing etc. next to that these methods have proven themselves as the current norm (Groote et al., 2005).

Prince (projects in controlled environments), is described as an effective and structured method which applies for a large scope of projects (Groote et al., 2005). According to the method,Prince2 ,each process has to be conducted in each project but based on the content of the project there has to be scaled (Groote et al., 2005).

PMBoK (project management body of knowledge), is described as a source of knowledge in project management (Groote et al., 2005). This method only describes the processes and not the application of these. Therefore before applying this method on a project, there has to be decided what can and can't be used (Groote et al., 2005). These project management methods do not include a phasing method or any phasing at all (Groote et al., 2005), however the phasing is not just important but even required as described before.

The literature shows that the methods which are on the market are very much existent out of 'safe' actions and procedures, very planned, detailed etc. Most of the core elements of these project management methods are quite contrary to the strengths of Ericis. Ericis their strength is flexibility however within the methods it is about constantly thinking back and forth which does not fit the flexible actions of the team.

As mentioned before the aim of the final tool is not to change all parts of the team's work structure however to improve it. Therefore these strict project management methods will not fit the objectives and design requirements of this assignment. Although the final product and or service is aimed to be personalised for Ericis project management, certain essential and relevant elements can be derived or replicated from these existing methods. An example is the project plan which is used as the first and core decision document in multiple methods and will solve the lack of process documentation and unclear task division.

Another very different project management method which is not discussed in the literature is the Scrum method. Scrum is an agile way of project management. The Scrum process exists out of continuous iterations also known as sprints, at the end of such a print there is a draft product delivered. This method is quite similar to a design process, due to its iterative nature, and it is applied in multiple project management departments.

The internal research showed that the Ericis team does not have a strict process in which there is an explicit go or no moment. Although the scrum method can bring a lot of improved results to projects, it does not fit the structure that Ericis requires at the moment. In the future when there is a clear work structure, methods as these might be interesting.

1.2 LITERATURE RESEARCH & ANALYSIS

discovering the solutions to the core problems

Core Quadrant model

Both the internal as literature study showed, that other than to the problems within EPM, there are numerous strengths within this department. The contrary part of this is that the strengths are somehow related to their weaknesses. Their flexibility for example, is outstanding especially when regarding the flexibility of other similar organisations, and therefore this is strength which separates them from their competitors. At the same time the department suffers a lack of structure.

In order to gain a clear perspective on the organisational character of the team in specific their strengths and weaknesses, the core quadrant model by Daniel D. Ofman is applied, see figure 9.
The 'Core quadrant model' is a model based on individuals, however can be applied to organisations as well. This model is based on four aspects: core quality, allergy, challenge and pitfall. This model together with other involved aspects accommodate the individual or organisation to get to know him or herself better (Anon, 2017). In this way, a better understanding of one's strength, weakness and identity is created, which provides a clear vision based on which underlying problems can be retrieved. With this model a schematic and simple illustration on the team is created, see figure 9.

The previous internal research resulted in the discovery of three core problems, next to the problems the study also showed another side of the team's performance which was amazing. These strengths of the team were hard to describe due to the fact that these were not clearly different from the problems.
This core quadrant model illustrates how the strengths of the team are connected to the weaknesses of the team. Their strengths and weaknesses are the exact opposite from one and another. The model, see figure 9., shows that the discovered core problems are initially strengths however due to excess of these strengths, the core problems are created. It comes down to a need of balance in which there is no excess of a strength or challenge, but just as much as needed.

This model is based on the internal study however in order to test the viability of this model, each member of the team also filled out the core quadrant model. The models created by the team members were basically the same as the model based on the internal study. There was one completely different and interesting challenge: transparency. The employee explained that that the company keeps a lot of information behind closed doors which makes communication with partners difficult since not all the information can be shared. This transparency would make the communication more open and easy.

Concluding, the team actually functions great however due to the lack of balance their qualities turn into their pitfalls. With a tool that facilitates their strengths and creates a balance, their organisational as well as their process structure will be improved.

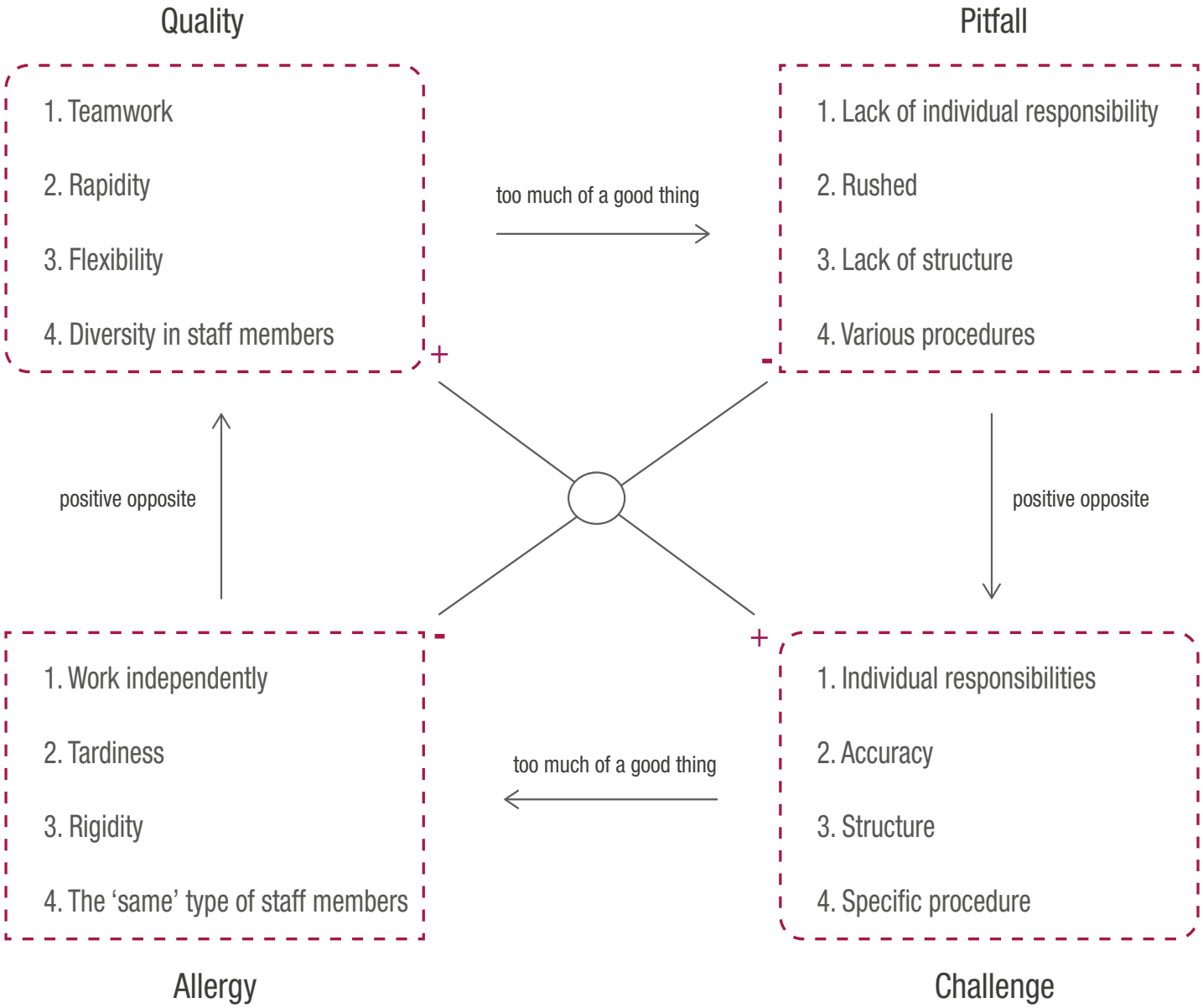

Figure 9. The EPM core-qudrant model

1.2 LITERATURE RESEARCH & ANALYSIS

discovering the solutions to the core problems

The Dreyfus model of skill acquisition

The final applied academic model is the dreyfus model of skill acquisition. Students or professionals are subject to this model. The dreyfus model shows five stages of skill acquisition of which each stage exists out of different characteristics.

On each level upwards, one receives improved and new characteristics, the acquired skills influence one's way of thinking and performing. Based on this theory, it can be assumed that people in a team with different levels of skill acquisitions can encounter obstacles in the teamwork due to the fact that their performance etc. is on different levels.

One of the team's strengths is the diversity in staff. The core quadrant model showed that this could lead to the pitfall of having various work structures. Both the conducted interview and observation showed the lack of a general method or work structure. The dreyfus model of skill acquisition is applied to create a clear perspective on the team members of EPM and how they contribute to the lack of a general work structure or method.

The team exists of six core members of which two are experts, two proficient, one competent and one an advanced beginner. This is a large variety in one team, each member regards things differently and copes with things differently. All the employees treat the knowledge in context however this is the only aspect in which all the employees perform the same.

The biggest gap in the team is on 'decision making'. Only the experts make decisions based on their intuition, which is due to their expertise and the other employees make rational decisions. The CEO, which is one of the experts, is the link between the team because he is skilled as such that he can connect the levels (characteristics) of each employee and make it work. Without the CEO the team would suffer multiple problems in regards to decision making.

The CEO is aware of the fact that he has to make the final decisions because he is the only one that is able to connect all the dots. The team, however, does not see it this way.

The team actually would like the authorisation to make decisions on their own without depending on merely one person to make the final decisions. The team believes that they are ready and able to make final decisions. It is interesting to see that on most subjects everyone is on one page however on subjects as these there is a clear difference in vision.

The dreyfus model shows that in theory there have to be major decision making problems in the team due to the fact that within the category of decision making everyone's on a different level. The prior conducted internal studies did not show this problem to the extent that it should be visible. This is due to the CEO who is able to connect and decide based on his expertise.

Novice-to-Expert scale (1)

Level	Stage	Characteristics	How knowledge is treated	Recognition of relevance	How context is assessed	Decision-making
1	**Novice**	Rigid adherence to taught rules or plans Little situational perception No discretionary judgement	Without reference to context	None		
2	**Advanced beginner**	Guidelines for action based on attributes or aspects (aspects are global characteristics of situations recognisable only after some prior experience) Situational perception still limited All attributes and aspects are treated separately and given equal importance	In context		Analytically	Rational
3	**Competent**	Coping with crowdedness Now sees actions at least partially in terms of longer-term goals Conscious, deliberate planning Standardised and routinised procedures		Present		
4	**Proficient**	Sees situations holistically rather than in terms of aspects Sees what is most important in a situation Perceives deviations from the normal pattern Decision making less laboured Uses maxims for guidance, whose meanings vary according to the situation			Holistically	
5	**Expert**	No longer relies on rules, guidelines or maxims Intuitive grasp of situations based on deep tacit understanding Analytic approaches used only in novel situations or when problems occur Vision of what is possible				Intuitive

Adapted from: Dreyfus, S E (1981) *Four models of human situational understanding: inherent limitations on the modelling of business expertise.* USAF Office of Scientific Research, ref F49620-79-C-0063; Dreyfus, H L & Dreyfus, S E (1984) "Putting computers in their proper place: analysis versus intuition in the classroom." in D Sloan (ed) *The computer in education: a critical perspective.* Columbia NY, Teachers' College Press.

Literature research Conclusion

It was immediately clear that the core problems were connected to the lack of certain fundamental project management elements, see figure 10. The literature explicitly describes problems which are identical to some of the core problems, and how these are caused by the lack of required fundamental elements in project management. The core problems are not complex codes which are hard to crack however just missing fundamental requirements in project management. However, designing and developing a tool which will enable the implementation of these fundamental requirements will be a code to crack.

It is remarkable that the strengths of the team were closely related to the core problems (weaknesses). The core quadrant, based on the results of the internal research, placed the contrary analysis of the overlap between the team's strengths and weaknesses in perspective.

The team's success appeared largely due to the key role of the CEO which is skilled in not only managing from his own perspective however also from other skill levels.

The literature and models showed that in order to solve the core problems which are: structure, process documentation and a clear division of tasks and responsibilities, several fundamental project management elements have to be applied such as: phasing, decision-documentation and hierarchical lines, see figure 10. The following positioning statement describes the final design and its design requirements.

´Ericis X, is a supporting projects & process management tool, for the Ericis project development team. They seek for structure, a clear division of tasks & responsibilities and process documentation. It does so by providing management support regarding the phasing, hierarchical lines and decision documentation of each project. ´

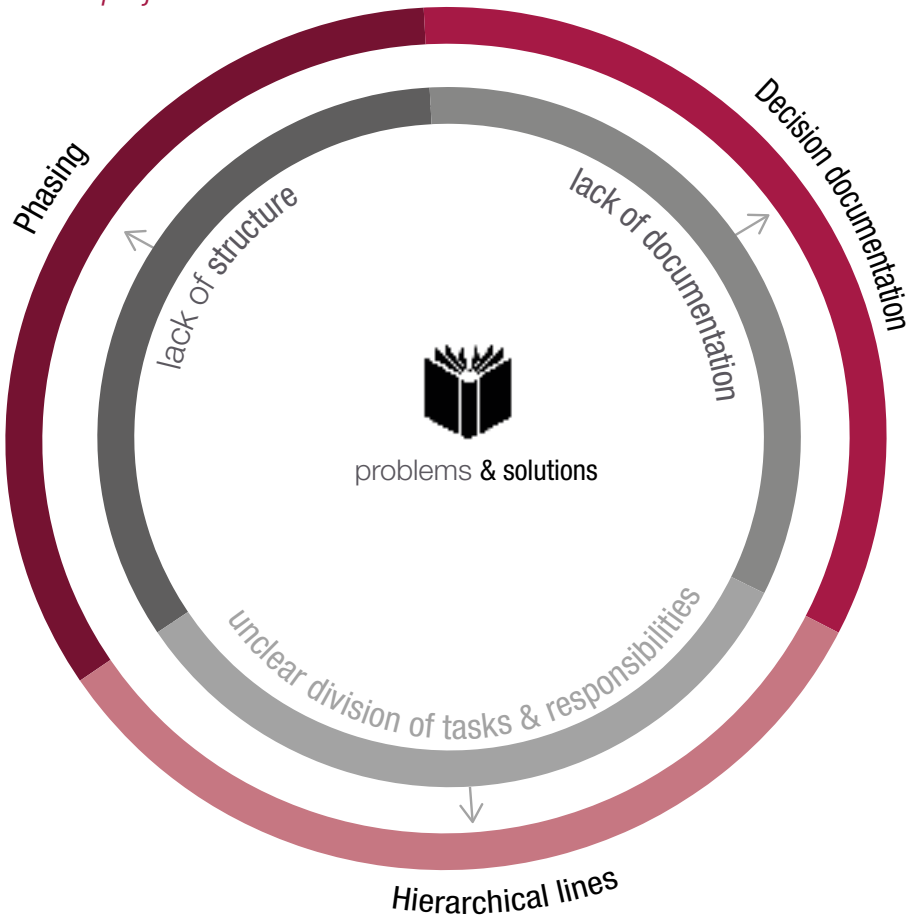

Figure 10. Literature research results which are the solutions to the core problems which were resulted from the internal research

1.3 DESIGN BRIEF

the defined assignment

The design brief is a fundamental element of this project. Within this brief all the essential information regarding this assignment and the requirements of the final result is given. This brief exists out of information from the internal- and the literature study. This design brief defines the scope of this project and its future results.

Introduction

The Ericis b.v: real estate consulting and design department, is specialised in the transformation and re-development of real estate. This project management team focuses on design, engineering and concept development.

Their performance, as well as their execution, are on a high level. In order to obtain and maintain this level the team conducts a (project) process which exists out of multiple challenges. There are both unforeseen challenges (outside of the team's control) as caused challenges (in the team's control), both interrupt the progress of the process.

The team does not have a tool or specific guideline (consistent) with which the challenges can be tackled nor a specific method or work structure through which the project process is conducted. This creates a lack of consistency (an exact pattern which repeats itself in different contexts).

The team requested a tool which facilitates the management of the project process as well as the management of all the running projects. With this tool, the team aims to perform seamless and manage the project challenges better.

The team copes with multiple difficulties on a daily basis due to which they requested a project management tool. The company has not explicitly defined any design requirements however based on the assignment there are at least two important requirements of which one requirement is that the tool has to be based on the Ericis process, so personalised for this specific company and department. Another requirement is that there has to be an overview of all the projects and of the project process. In order to define the other design requirements of this tool and to discover the core problems which underlie the assignment: two studies are conducted.

Internal research

The first study is an internal research in which the core problems of all the (problem) symptoms are discovered. This study shows why the project management tool is required. The difficulties the team experiences are most likely to be connected to less visible large problems. The core problems have to be solved through the project management tool.

The internal research was conducted through three methods: interview, observation and project assistance. The diversity in methods was aimed to retrieve different kinds of results. Each method was on a different level of involvement (insider and outsider) and resulted in different problem symptoms, although these symptoms were very different, each symptom was related to another. By connecting and analysing the research material, an explicit division and grouping of the problem symptoms were created. All the problem symptoms resulted in three core problems.

The research answer and conclusion of this study is the following problem statement: The core needs for a seamless and optimal project- and process management are: organisational structure, process structure, process documentation and clear task and responsibility divisions.

Literature research

The second study is the literature research in which the aim is to discover the solutions to the core problems. The results of this study are the defined design requirements of the final design. This study is conducted through literature and academic models. The content of the literature, Projecten Leiden (Groote et al., 2005), is in line with the content of the assignment. Information regarding the cause of the three core problem are retrieved from this literature. It appeared that the core problems are due to lack of certain fundamental project management elements. The design requirements or solutions to the core problems are the application of: phasings, hierarchical lines and decision documentation.

Another part of this study is the application of academic models. One of these academic models is called core quadrant of Ofman. This model exists out of four quadrants: quality, pitfall, challenge and allergy. The model was developed for the EPM team based on the internal research results. The final model showed that there is a strong connection between the qualities and core problems of the team. It appears that both of these discoveries of the internal study are each other's opposites.

The core problems are initially the team's strengths however due to an access of the qualities they turn into pitfalls. The results of the literature study are connected to the challenges of the team. The results of this brief study are extremely important for the team moving forward, if this does not change they will encounter the same problems again.

Conclusion

The conducted studies defined the exact design requirements which are stated in the following positioning statement:
Ericis X, is a supporting projects & process management tool, for the Ericis project development team. They seek for structure, a clear division of tasks & responsibilities and process documentation. It does so by providing management support regarding the phasing, hierarchical lines and decision documentation of each project.
This positioning statement describes all the required aspects of the final design. The final design has to suffice to this statement.

'From Rigid to Seamless'

CHAPTER TWO

PHASE II

IDEA GENERATION

2.

The second, ideation, phase is one in which ideas are generated, based on the prior defined problem- and positioning statement. This ideation is conducted within sessions which are accommodated by Delft Design Guide methods.

2.1 IDEA GENERATION SESSIONS

developing ideas based on the design brief

Introduction

The next step in the design process after the research and analysis phase, is the ideation phase also known as the idea generation phase. Within this second phase it is aimed to develop ideas based on the assignment and the results of the studies.

The two studies which are conducted in the research and analysis phase resulted in two fundamental statements, the problem statement and the positioning statement, These are subject in some of the ideation sessions. The problem statement is concluded from the internal study and describes which core problems are the cause of the multiple problem symptoms that the team encounters.
The literature study resulted in the positioning statement. The positioning statement concisely describes the solution to the core problems together with some other design requirements. The statement basically described the entire final design in an abstract form. These essential insights are the foundation of the ideation phase. The positioning statement is the criterion to which all the clustered final ideas will be measured.

The ideation is facilitated by four different methods. These methods are: Brainwriting & drawing, Lego serious play, Analogies & metaphors and Brainstorming (Boeijen et al., 2014). Each method was separate from the other and was not connected to another. These different methods were chosen in order to generate different types of ideas. The first two of these methods are conducted by the team and facilitated by the design student while the other two are individually conducted by the the design student.

The first joint method, Brainwriting & drawing, is aimed for the team to express every single idea they have regardless if it is feasible or not.
The second joint method, Lego serious play, is a very active and creative method. Both physical as mental activity is required in order to describe and communicate an idea. The activities force the user to thoroughly think certain situations, ideas etc. through.
Analogies & metaphors is an out of the box method which allows you to completely move away from the subject at hand and view to same situation or problem in another context. Inspiration and knowledge can be gained from the way the situation is solved or approached in this different context. This solution can be translated to the original context of the assignment. This method provides a very different view through which unexpected ideas can be developed.

The final method is the well known brainstorm. This brainstorm is similar to the brainwriting & brain drawing session however slightly different in execution.
The data(results) of each session is stored untill all ideation sessions are conducted. Once the ideation sessions are finalised, all the generated ideas will be clustered based on the positioning statement.

The users are involved in the ideation process in order for them to define their wishes in regards to design, features etc. By developing ideas themselves they decide what type of system or product they would like to work with etc. The user is in the same position as the designer and has control over what features or what ideas the final product will consist of.

This concept of generating ideas together with the user regarding his or her product is called co-creation. In co-creation the designer and the user work together towards the design. The user is closely involved in the design process. Co-creation is applied in order to design a product that will not merely solve the core problems but to also design a product that provides in all the wishes and needs of the users.
There is also a psychological benefit to co-creation because the users will feel truly connected to the final product due to the fact that they developed parts of the design themselves. This creates a connection and identity to the final design which is not merely developed and designed by an outsider but by the entire team. The product becomes a real Ericis product which it is aimed to be.

Ideation sessions & results

Brainwriting & braindrawing (BW&BD)

The first ideation session is accommodated by the Brainwriting & brain drawing method (Boeijen et al., 2014), see figure 11. This method is used to start the idea generation which it is very useful for. Its aim is to avoid premature criticism and it is assumed that quantity leads to quality (Boeijen et al., 2014). The activities within this method are simple and therefore allow the users to get the feel of it. This is a co-creation session and is therefore conducted by the EPM team, the end users of Ericis X, and facilitated by the design student.

The brainwriting & braindrawing session surrounded the following question:
How can the application of phasing, hierarchical lines and decision documentation be facilitated?

The ideation method, Brainwriting & Braindrawing, is an easy and accesible way to generate several ideas without any restrictions or limitations. Every idea is useful.

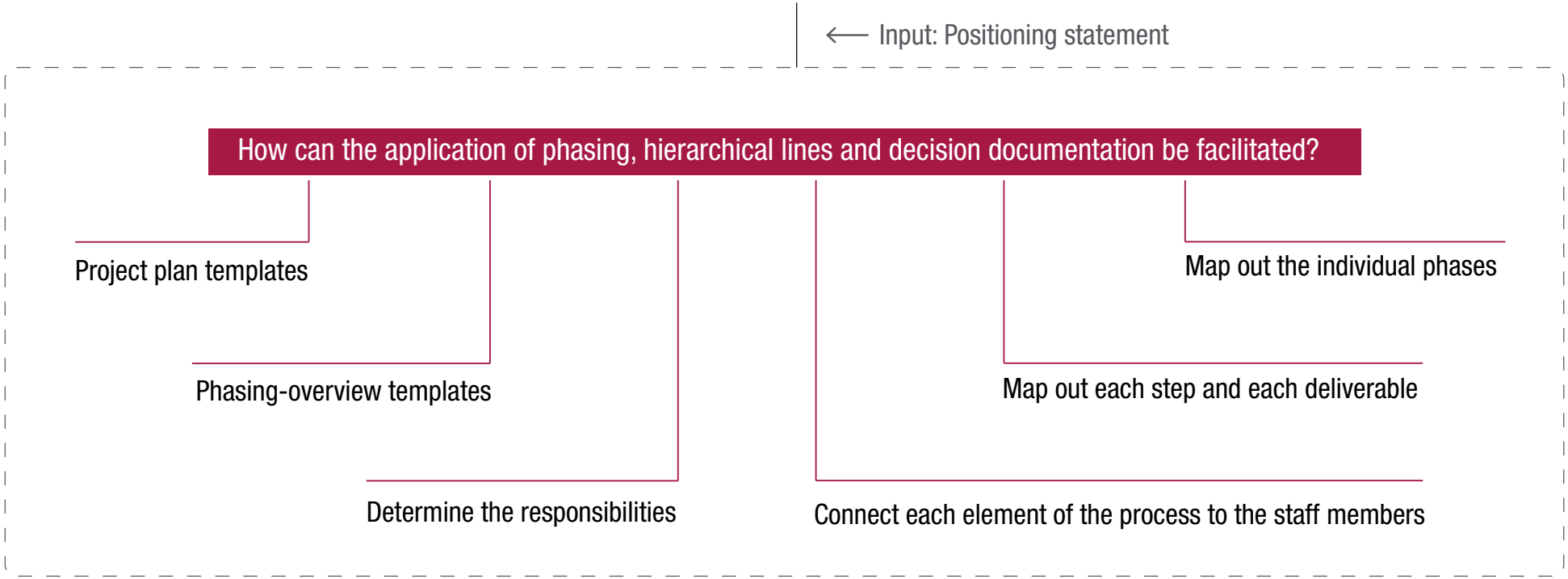

Figure 11. Schematic overview of the BW&BD ideation session from method to results

This question is based on the positioning statement which describes the design requirements of the final product. It took quite some time for everyone to understand the question at hand and therefore this question was explained and re-phrased.
The aim of this session was to generate ideas regarding the final design of Ericis X, so through what can the three solutions to the core problems be facilitated. Everyone had to perform individually at the start of the session and following discuss the ideas, however no one did. Instead everyone discussed their ideas etc with each other, again the team was working together instead of individual.

The student , who facilitated this session, guided them into performing individual and constantly tried to create progress. This session progressed extremely difficult due to the fact that this was the first time the team performed in such activities. Due to these difficulties merely six ideas were generated. The results are not actual explicit ideas, these are more product features. Despite the difficulties each user was able to answer parts of the question and express how he or she wants the core requirements embodied in the product. Following, are the results of this first session.

BW&BD results

1. Templates project plan e.g. change management log.
2. Template phasing overview of the multiple projects with respect to each other.
3. Determine at the start of each project who carries which responsibility.
4. Map out the individual phases
5. Map out the individual steps and deliverable products of these phases
6. Connect the steps and deliverables(products) to the staff members (responsibilities).

2.1 IDEA GENERATION SESSIONS

developing ideas based on the design brief

Lego Serious Play (LSP)

The first ideation session did not run smoothly and showed that it is quite difficult to get the team into the activities of the session. The second session is accommodated by a completely different method: Lego serious play, see figure 14. In this method ideas or answers are communicated through a lego model which has to be build in a strict timeframe. As once quoted by a facilitator: *"if you can think it you can build it".*

The lego serious play method is a radical and innovative process which is aimed to enhance business performance *(Lego, 2017).* Over the years this method gained popularity among facilitators and numerous other fields, this session was again facilitated by the design student. The solely models do not convey that much of information however together with the story behind the model this becomes a clear situation or idea. The assignments which were core to this session are:

1. *Build your ideal solution to the core problems*
2. *Jointly build the ideal solution to the core problems based on your prior individual built models*

As the name of the method already reveals, the activities are conducted through lego blocks. This session exists out of both individual work as teamwork, which is similar to a normal working process of a project management team. Initially the activities are conducted by each user individual, see figure 12, and following the team works together based on the prototype each person has build.

Lego serious play exists out of three steps, see figure 14. The first step are two exercises with the lego blocks in which one of the exercises each member

Due to these exercises the user gets a feel of the method and working with the lego blocks. After each building activity the models are explained and discussed through which everyone gains a clear understanding on the idea or answer. In the second step each user builds his or her ideal solution to the core problems. The final step is the creation of a joint ideal solution to the problems based on the individual models they have made.

"The use of LEGO® elements enables you to take a speedy shortcut to the core. The LEGO elements work as a catalyst and when used for building metaphors, they trigger processes that you probably were previously unaware of."- (Lego, 2017)

Contrary to the BW&BW session, this session progressed seamless. There were no difficulties at all, the team was very enthusiastic and energised, see figure 13., due to the fact that they were using lego blocks to express their thoughts etc. and due to the fact that each activity had to be conducted in a small timeframe which motivated them to work on a rapid pace. The users were very open throughout this session and were also able to express and communicate their ideas.

The exact tasks:

1. Build your ideal solution to the core problems and following describe this solution that you have built.
2. Jointly build the ideal solution to the core problems based on your prior individual built models and describe these as well.

Figure 12. Lego model created by a user to illustrate her ideal solution

Figure 13. The users having fun during the LSP session

2.1 IDEA GENERATION SESSIONS

developing ideas based on the design brief

LSP results, figure 14.

1.

a. 'The ideal solution exists out of an overview on the activities within each project and foremost an overview of all projects in regards to each other. Next to this it also contains clear insights on the project's content, how is every element connected to each other. Another element is several phasings which don't have to be the same in every project. Clear communication of important actions for example important decision points. The final aspect is the possibility to reflect back on how a project has been conducted and learn from this information for the next project, basically a reflection.'

b. 'The implementation of at least more than one authorised decision maker. Currently there is one decision maker which is the CEO, Donald Dinkelaar, however every important decision that is to be made is depending on him. Due to his limited availability this does not happen immediately which often causes a delay in the process and causes other plans to be shifted. The hierarchical lines therefore should not cause too much independence because that will cause the current situation to get worse.'

c.'Each team member has his or her own tasks which is clear to everyone. Each person is aware of his or her role in the team. There is one person at the steering wheel of the project who remains an overview and keeps everything rolling while each person works both individually as together to move the project forward.'

d. 'A project management system which illustrates the phase which the project is in. All information can be documented in this system and later on you can reflect back to discover how you conducted that project and other information such as the amount of employees that were involved in that project. Everything can be stored in this system. This also allows a fast way of gaining an overview on everything that's going on. It would be the most efficient to divide the projects among the employees which creates a smaller scope for each person and it would be clear for everyone who to approach for certain information. This allows me to easily provide input to others once I know what everyone is doing.'

e. The ideal solution involves a planning, a planning per project which makes it clear for everyone to know when what activity should be conducted. Everyone carries his or her own tasks and responsibilities and passes these, when conducted, to others which will continue to work on it for example. Throughout the process each person supports and helps each other where required. Everyone has a clear appointed role in the team for example a contact person who is responsible for the communication with external parties. This solution also includes transparency in the communication etc. with external parties so everyone involved knows what to expect.

2.

a. The ideal solution exists out of two important aspects. A planning and the several running projects with different phasings. This provides an overview at the start of the project which shows where and what the critical points are or may be. The team should be on top of this planning by also making this planning theirselves. Each person has their own defined tasks. The team is responsible for a proper execution of the planning and project. Secondly the decision maker, Donald Dinkelaar, who is currently the only one authorised to make certain decisions, becomes more of an integrated part of the team instead of a person on the sideline. This will hopefully lead to an increase of authorised employees to make decisions.'

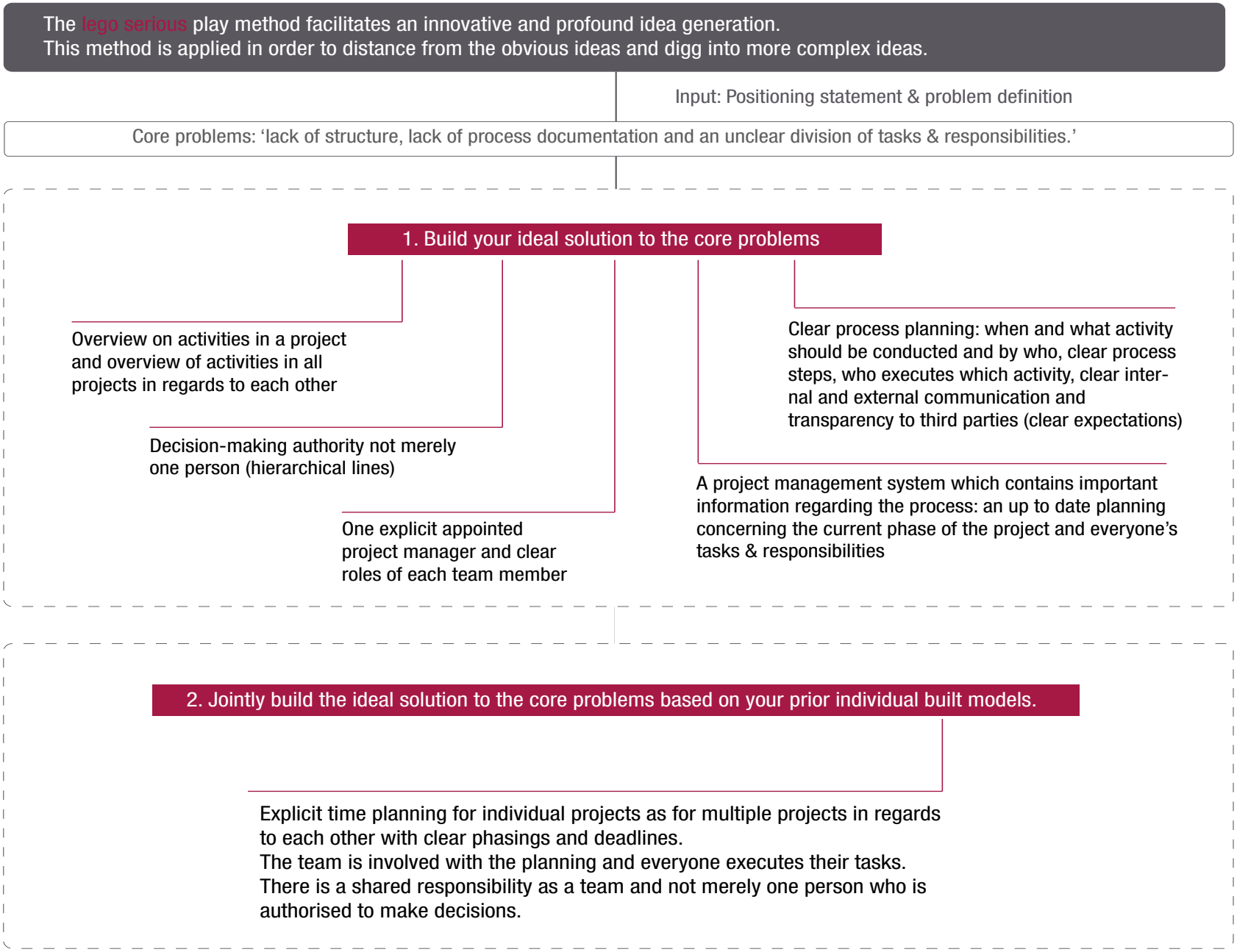

Figure 14. Schematic overview of the LSP ideation session from method to results

2.1 IDEA GENERATION SESSIONS

developing ideas based on the design brief

Analogies & Metaphors (A&M)

The first individual conducted ideation is the Analogies & Metaphors session. see figure 15.The following quote from the Delft Design Guide expresses what happens in this session:

"Seeing an existing problem through the lens of another domain supports the creation and exploration of novel solutions." - (Boeijen et al., 2014)

The method: Analogies & metaphors, does not merely accomodate the idea generation process but even more specific the generation of innovative ideas. Within this method, inspirational domains in which the core problem is already solved, are retrieved and analysed in order to discover new solutions which are derived from the solutions in the domains (Boeijen et al., 2014).

This method exists out of three steps in which at first the Analogy and Metaphor are defined. Following, multiple domains are retrieved where the problem has been successfully solved (Boeijen et al., 2014). Finally the problem and solution connection is analysed and abstracted. From the abstracted core information, new ideas are generated (Boeijen et al., 2014)

Following are the step by step results of the Analogies & Metaphors session.

A&M steps 1-2-3, figure 15.

STEP 1 - Framing

Analogy:

The core problems, which are latent to the challenges are the lack of: structure, process documentation and a clear division of tasks & responsibilities.

Metaphor:

They seek for structure, a clear division of tasks & responsibilities and process documentation. The tool should do so by providing management support regarding the phasing, hierarchical lines and decision documentation of each project.

STEP 2 - Searching

1. A none properly functioning muscle is the root of multiple symptoms (problems)

An impaired heart muscle is the core problem to a large amount of symptoms (problems): weight gain, fatigue, decreased appetite, concentration problems etc. Each of these symptoms can be treated however the treatment will never lead to the aimed result. In order to reach the aimed result (recovery) the core problem needs be prognosed. Once the core problem is treated and tackled e.g. with medication, none of the symptoms (problems) will occur anymore (unless the disease is incurable)

2. One fundamental change can improve multiple aspects and eventually an entire corporate system

Tesla motors is now a successful brand however initially the electric vehicle was doomed to fail. Due to management failures, the price was set twice as high as the originally implicit price (Astrum People, 2015).

Elon Musk, one of the shareholders, took matters into own hands when he decided to fire basically the entire project development team and started to manage the company himself. With his management skills, vision and most of all drive, he kept the company going. With Musk as CEO of the company Tesla motors reached its success.

This situation clearly shows how the head of a company can determine whether a company is successful or not (with disregard to the exceptions), based on his management and decision making.

The multiple problems, initially, in the company, which caused the extremely high selling price of the electric vehicle were all connected to one fundamental factor which was the head of the company.

Elon Musk has shown that with one crucial change of CEO, the entire company can change.

3. Failure of a successful business due to crucial mistakes in the management of the development team

Ten years ago the smartphone Blackberry was leading in the smartphone industry (behind Nokia of course). Its success started in the United States and was followed by multiple other places in the world. This business smartphone was used by celebrities, due to its excellent security etc., which arose the popularity of the product.

Its blackberry messenger was a less successful precursor of the current whatsapp. The fact that Blackberry is out of the smartphone market is due to the fact that their extreme success collapsed years ago. Blackberry was leading before the Apple iphone or Samsung did.

Blackberry however made some extreme mistakes which cost them their success and leading position in this industry. First off, they did not watch their competition as they never thought they would lose their position on the market. They did not disruptively innovate as all the others did e.g. the competition started implementing the touch screen however blackberry did not notice this and stuck by their plastic keys and small screen.

Another mistake was that they restricted the application of blackberry messenger to their hardware only e.g. the cross-platform success of whatsapp (The Verge, 2016).

Finally next to multiple other misers they have made, they allowed themselves to much failures while they could not afford these due to the fact that they did not have billions of users yet. These mistakes Blackberry made are related to fundamental mistakes within the management team. Lack of: proper R&D, innovation (disruptive), trend- and competitor analysis etc. Apple's reason of being: constantly challenging the status-quo, in other words,constantly innovating is what determined their success.

4. Multiple negative traits (unconscious) which are caused by a traumatic event in the past

People rather not associate with someone who has some very messed up traits such as lying, whining, bad tempered, cold hearted etc. However, the reason someone behaves such a way is often due to certain traumatic events in their lives. When someone has been hurt, abused or abandoned etc., and they do not properly process and heal from everything that has happened, it can cause them to unconsciously behave in a certain way to others. This can be due to the fact that they guard their heart or for other reasons. This is often something unconscious. Others might think the person has not been properly raised or the person's character is just like that, while not knowing that their behaviour is an unconscious outburst of a traumatic event. Professional help from a psychologist can help find the root of the person's issues and help process the trauma.

5. Multiple mechanical issues all caused by one defect motor

A car, especially, an old one, does not always function as optimal as it should. This might be experienced by a slow start, vibrations of the steering wheel etc. these issues can all be caused by one defect motor. A car technician can analyse the problem, find the defect motor and repair or replace it.

STEP 3 - Applying

Analogy

1. A non properly functioning muscle is the root of multiple symptoms (problems)
2. One fundamental change can improve multiple aspects and eventually an entire corporate system (company)
3. Failure of a successful business due to crucial mistakes in the management of the development team
4. Multiple negative traits (unconscious) which are caused by a traumatic event in the past
5. Multiple mechanical issues all caused by one defect motor.

<u>New problem situation:</u>

Latent core (foundational) problems, which cause multiple other problems. The core problem need to be solved in order to solve all other related problems.

Metaphor - inspirational area

1. Medical treatment e.g medication
2. New head of company - CEO
3. Strategic model-plan of a company
4. Psychologist - professional help
5. Technical reparation or motor replacement

2.1 IDEA GENERATION SESSIONS

developing ideas based on the design brief

A&M final results

1. Specific treatment

In order to solve a non properly functional muscle an according medical treatment is required which could be medication. As long as this non functional element is not treated, the pain and side effects will be manifested in someones body. Imagine using paracetamol against the caused stomach ache, this might help for a few hours or for a day however this symptom will repeatedly manifest itself untill the actual dysfunctional muscle is treated. Only than the symptoms will be permanently gone. This same principle can be applied to the problems at hand in this project. Through the treatment of the non functioning elements in the department, by for example a method as medication, the manifested problems symptoms as well as the dysfunctional elements of the organisation are solved.

2. Organisational change

An organisation runs based on every involved member. However, there could be a weak link which affects the entire organisation. Such a weak link is mostly one at the top of the hierarchy otherwise it could not affect the entire organisation but merely a part of it. Such an employee is a fundamental element to the organisation, replacing or changing the role of this person could bring surprising changes to the company. There could be a project manager within the organisation who is not fit for that position. A manager has a role of steering the team into directions and keeping them on track, however when this manager is not capable of doing so, projects might become distaters with such results.

One organisational change could lead to long awaited successful results. This change could be merely a switch in position. A person's strengths and weaknesses are important to consider when positioning them in an organisation. Someone who does not have the characteristics to lead and guide should not be a manager over a complex project.

3. Strategic innovation

Organisations at times seem to forget the importance of strategic innovation. The world develops and innovates every second. More knowledge is retrieved which lead to new systems, models etc. As an organisation it is important to stay ahead of the developments and to have a clear strategic vision according to which the activities and goals are determined.

An organisation's succes can blur the importance of strategic innovation and development. Being succesfull this year does not assure succes in a year.

"Success is never owned; it is only rented, and the rent is due every day!" - Rory Vaden

An organisation must work to improve itself otherwise the less successful competitors which constantly work on their strategy and innovation will have a competitive advantage and own succes next year. Each organisation, regardless of its succes status, requires constant strategy and innovation development in order to increase, create and or remain its succes.

4. Application of a specific expertise to certain phases or elements of the process

At times we are unable to define certain situations, problems or needs, simply because we are not aware or conscious of them. Most of the time there is a deeper layer to what we see on the surface, however without the knowledge of this we can not defined this layer. Some situations require a certain expertise in order to discover how to actually discover and cope with something. In such a situation an expert on that field is required.

5. Improvement or adjustment of certain elements

Within an organisation there could be some elements in regards to the process and workstructure that don't function properly. No matter how small an elements may be, if it does not function as it should it can ruin the entire process. Each element of a project process is intertwined and connected with each other, therefore one element which does not operate as it should can ruin an aspired seamless process.

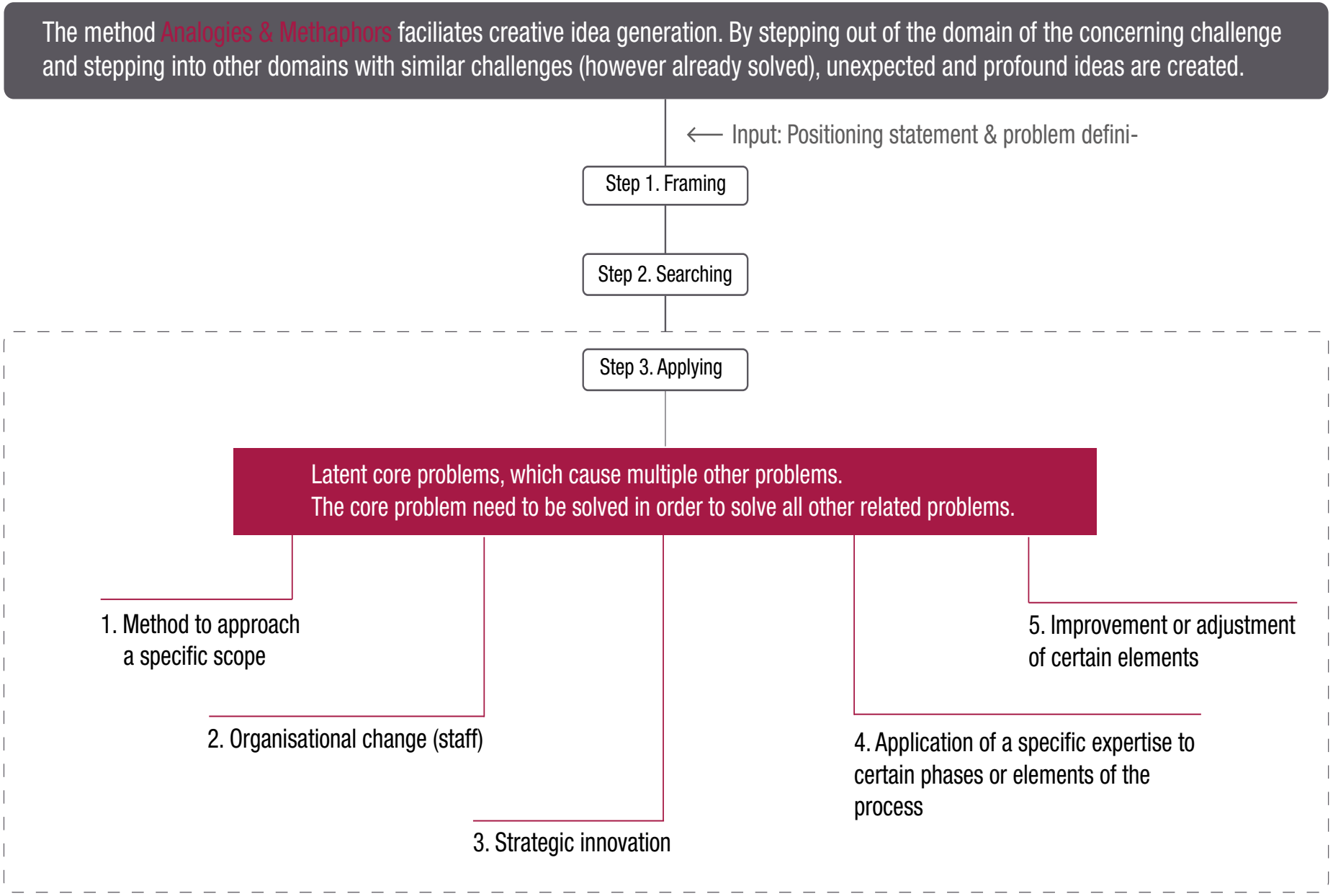

Figure 15. Schematic overview of the A&M ideation session from method to results

2.1 IDEA GENERATION SESSIONS

developing ideas based on the design brief

Brainstorming

Following all the very creative sessions there is one final ideation session which allows more of a simple way of generating ideas. This method is a Brainstorm.

Brainstorming is similar to BW&BD. This brainstorm session was slightly different from the standard procedure of quantity over quality. Instead the ideas were generated based on quality over quantity.

This session surrounded two simple questions, see figure 16., of which one question is the same as the one in the brainwritting and braindrawing session:

1. *What could be a projects management tool?*
2. *How can the application of phasing, hierarchical lines and decision documentation be facilitated?*

This brainstorm is individually conducted by the design student, the first similar session with the team showed that the team had a hard time dealing with such open sessions in which they have to generate ideas based on a question and foremost based on their personal preferences.

The ideas generated in this session were not all generated on the spot. Some of these were small ideas which were developed throughout the design process so far. This method offered a platform and procedure to express these ideas. Following are the results of the brainstorm ideation session.

1a. An interactive smart app which provides an abstract overview of the several active projects and the phases (of the process) they are in and future overviews of how these projects develop regarding each other. This allows the team to predict certain circumstances based on the overall view of all running projects however also based on the content of each individual project. The app also sends out a warning when there are crucial deadlines arriving.

1b. A physical calendar which provides an abstract overview of the several active projects and the phases (of the process) they are in and future overviews of how these projects develop regarding each other. This allows the team to predict certain circumstances based on the overall view of all running projects however also based on the content of each individual project

2a. Standardised digital documents (templates) which facilitate the proper documentation and implementation of the phasing and the decision documents with the specifications of the hierarchical lines included. A project process never goes according to the initial planning (the phasing and project plan etc.). Therefore these templates are designed to be modified. In case of unforeseen problems, which most definitely will occur, there is no need to panic, the documents are able to be modified based on unexpected or last minute changes and or needs.

2b. A digital platform (e.g. an interactive smart app or online server), which exists out of a long-term as short-term project planning based on the phasing of a specific project. The daily to be conducted activities are visible in the week to week planning, as of where the deadlines or milestones are initially visible in the overall month planning which is a derivation of the phasing and decision-documentation. Each activity is also connected to the responsible staff member (derived from the hierarchical lines stated in the decision documents etc.).

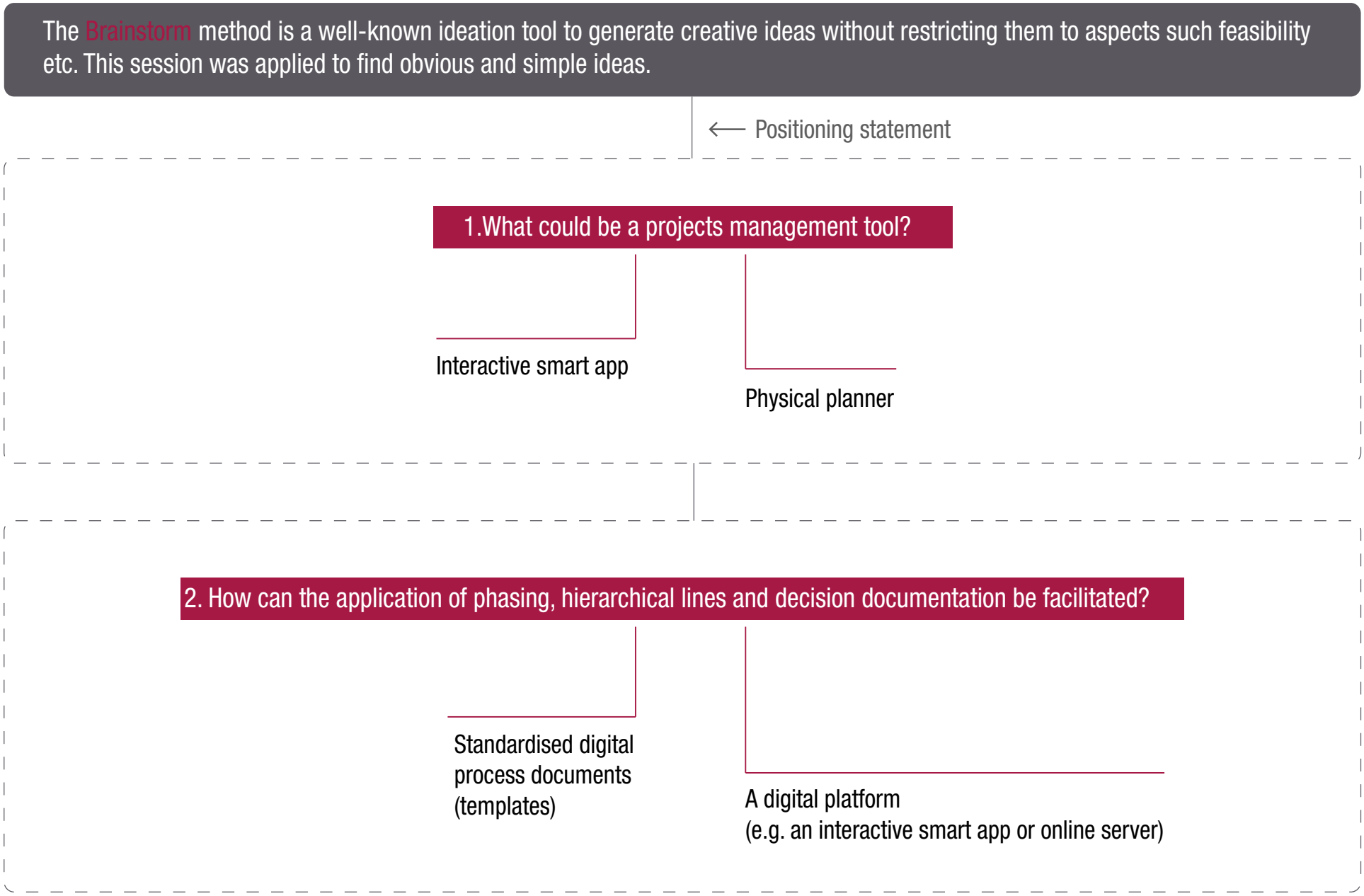

Figure 16. Schematic overview of the Brainstorm ideation session from method to results

2.1 IDEA GENERATION SESSIONS

developing ideas based on the design brief

Conclusion

The idea generation is conducted through four methods and sessions. Two of these sessions were co-creation sessions. Due to the co-creation, which is a process in which the designer and user work, develop and create together, the user was very involved in this phase. Instead of developing an idea which is unfamiliar to the users or which does not fit the company's identity etc., co-creation is applied so the users can participate and provide valuable input such as their personal preferences. The generated ideas were not always actual ideas however more features and functions of a potential idea. The users foremost generated features and not quite complete ideas.

Each ideation session was separately conducted without input from another session. There are four sets of results which are merged together as the idea generation results. The aim is to conclude this phase with one final idea which will be developed into a concept in the following conceptualisation phase. None of the idea generation results were complete ideas, in order to create a complete final idea a merge of some of these incomplete ideas and features is required.The results have to be filtered based on the positioning statement which is an abstract definition of the final design. The filtered cluster of ideas will be used as building blocks for the final idea, see figure 17.

The results will not merely be filtered based on the positioning statement however also based on the user input. The cluster is visible in the following visual.

Based on the final idea cluster, see figure 17., the following vision is created based on which the final idea will be developed.

'An interactive management tool which facilitates the planning of a project which involves the phasing , milestones and deliverables. The tool foremost accommodates the creation of a project plan and stores this data.'

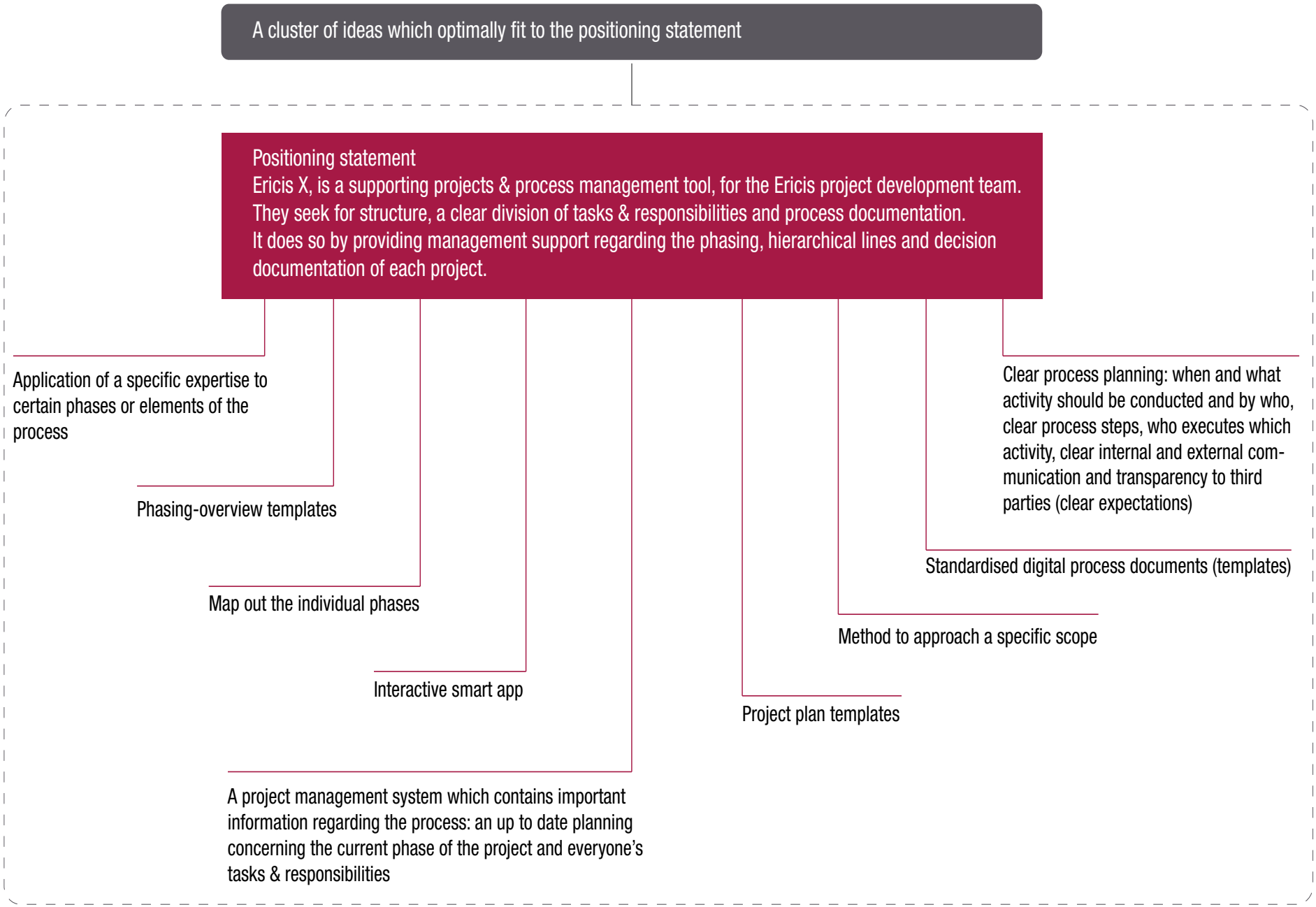

Figure 17. Schematic overview of the final idea cluster

2.2 FINAL IDEA

the answer to the design challenge

The final idea

A.'The Eri-tool, is an interactive smart app which requires specific input ,regarding the projects, which are to be defined in the project plan- and decision documentation templates. From this input, numerous fundamental elements are generated such as the long- and short term overviews of the project process. The user can zoom in and out on the project-phasing overview, as much as preferred or required. The application also contains personal pages, project pages and an archive which offers the users a continuous learning process.', figure 18

B. The application is both web as mobile

C. The procedure of adding a new project to the application merely exists out of filling in a projectplanning template in which several important elements regarding the project process are integrated. The exact projectplanning template will be created based on the results of the internal and external research (e.g the hierachichal lines will be defined) and additional research.

D. The application processes the information of the projectplan template and synchronises this with the stored standard Ericis phasing

E. The processed data is visible in a layered planning. The first layer of this planning is the overal phasing of all projects.

F. The second layer of the planning is zooming into a specific project and or specific phase, in which a more specific and short-term planning is visible. E.g.the design phase of the Newtonlaan project exists out developing a final design and sevral activities leading to that. The exact activities are indicated together with the initials of the responsible employees.

G. The application also exists out of personal profiles in which each employee can specifically view their activities within a specific project or on a specific day etc. They can also view each others tasks and responsibilities in order to discover who to approach regarding certain specific subjects.

H. The last but not least element of the application is the project library. This library contains the data of all conducted projects and forEmost the reflection on those projects: what went extremely well and what went wrong? By creating this library the employees can learn from past mistakes and improve these or retrieve other relevant information from past projects.

Figure 18. Visual scenario of the Eri-tool from A to H

CHAPTER THREE

PHASE III

CONCEPT DEVELOPMENT & DESIGN

3.

The third phase regards the conceptualisation of the final idea. Within this phase, a literature study will be conducted in order to thoroughly define the feasible details of the concept. Next to this, the first user test will be conducted based on the interface design. Based on all the retrieved data, the final concept design is defined.

3.1 THREE CONCEPT PILLARS: DATA, UI & UX

development of the design solution

Introduction

The ideation phase generated numerous ideas and features based on which the idea is created.
The next step is developing this idea into a concept which is a clear and extended description of the final tool based on which the final tool can be designed. The final concept exists out of more than the research results, creative ideas and user input. In order to develop a concept that is feasible, user friendly etc., additional context specific research is required in order to make well-grounded decisions regarding every single aspects of the app.

The app exists out of three fundamental elements , see figure 19. & 20., which are core to: the functioning of the app, the user behaviour, the user experience and foremost the enabling of phasing, hierarchical lines and decision documentation. The functioning and facilitation of especially the three last aspects is essential in order to solve the company's core problems which are a lack of structure, a lack of a clear division of tasks and responsibilities and a lack of process documentation.

The three fundamental elements which together form the Eri-tool are the data (content), the user interface and the user experience, see figure 19. Research will be conducted regarding these three elements and how these should specifically be designed and facilitated in order to create a final product that suffices to the positioning statement and will solve the core problems. This comes down to the fact that for example the content of the app should contain information which the users should be able to retrieve or are required to see, this again is related to the core problems of which one is the lack of structure(clarity).

In standard projects; persona's are created which represent the user and based on which design choices etc. are made. This project does not require the persona's due to the fact that the designer is in close contact with the actual users and is able to design based on information that is retrieved or observed from the user.

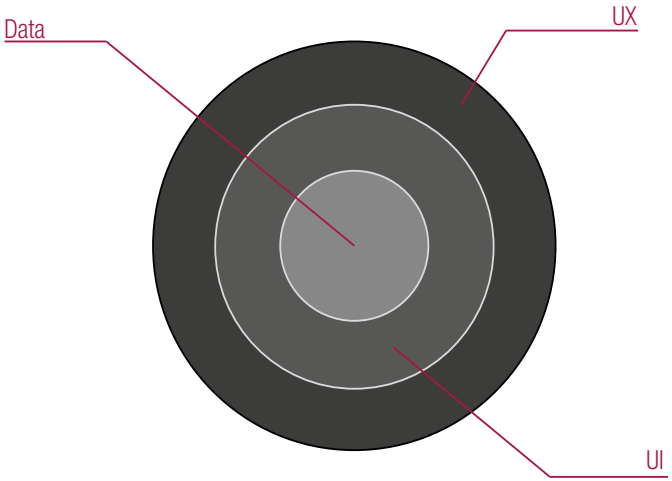

Figure 19. The Eri-tool

Data

In order to define the content of the app, a research is conducted through the book: about face 3 - the essentials of interaction design (Cooper, 2007). The most fundamental aspect of the application are the data elements (Cooper, 2007). These data elements are the *template-documents* (all project information) and the *standard Ericis project phasing* (information regarding all phases).

In the ideation phase the users indicated that they prefer templates of the standard documents such as the project planning. Blank slates are most likely to intimidate people therefore these pre-designed templates are aimed to solve this and to give the user less of a workload (Cooper, 2007).
These templates are developed based on the insights and results of the internal and literature study. These studies showed the problems and solutions based on which the templates are created. Throughout the creation of these templates it was important to formulate the right questions in order to make sure that the data that is required is retrieved without repeating prior questions.

"These are the basic units to be referred to, responded to, and acted upon by the people using the product, and ideally should fit with the persona's mental models" (Cooper, 2007).
These data elements go hand in hand with the functional elements, see figure 20.
"Functional elements are the operations that can be done to the data elements and their representations in the interface" (Cooper, 2007).
These functional elements facilitate the response activity on data elements such as placing information in the templates. The templates can be viewed in Appendix E.

Data elements	Functional elements
Project planning template	Add all project information
Decision document template	Add information on prior phase, decision points and next phase
Phasing overview	Modify phases
Reflection template	Add all requested information

Figure 20. The Eri-tool content framework

3.1 THREE CONCEPT PILLARS: DATA, UI & UX

development of the design solution

Ericis project phasing

An important and fundamental part of the tool is the entire EPM process from acquisition to completion. This process is not documented or such by the company and therefore designing an Ericis process scheme will be the initial step towards the final design. Instead of creating a process book, there will be designed a scheme, see figure 21. This scheme is based on the process timeline, phases, activities, products and employees. The process scheme is designed very general so all types of projects can be applied.

The data within this personalised process scheme is retrieved from the internal research, the company's tribes process book and from one of the project managers. For some projects there will be additional activities required etc. but that completely depends on the content of the project.

There are seven process phases of which each phase is connected to the responsible team members, figure 21. Each phase exists out of several activities and final products which are created through these activities. Some of the phases, such as the financial preparation phase, do not have a specific start and finish point and therefore overlap with other phases. The financial (preparation) phase is over the entire project process in development and therefore this phase finishes at the end of the project.

Specifications such as the exact timeframe of the process scheme is not indicated due to the fact that each project has a different timeframe and different content. This means that in one project there can be a long design phase and short construction phase however in another project there could be a short design phase and long construction phase. Together with the team the standard timeframe of each phase has to be defined in order to easily measure new projects to this standard project timeframe and so adjust the scheme based on the content of a project.

Based on user feedback this process scheme is multiple times improved, however it is assumed that the user feedback was not quite complete and therefore the scheme, most likely, needs to be further improved.

This Ericis schematic phasing is one of the fundamental elements of the final product and or service, figure 21.

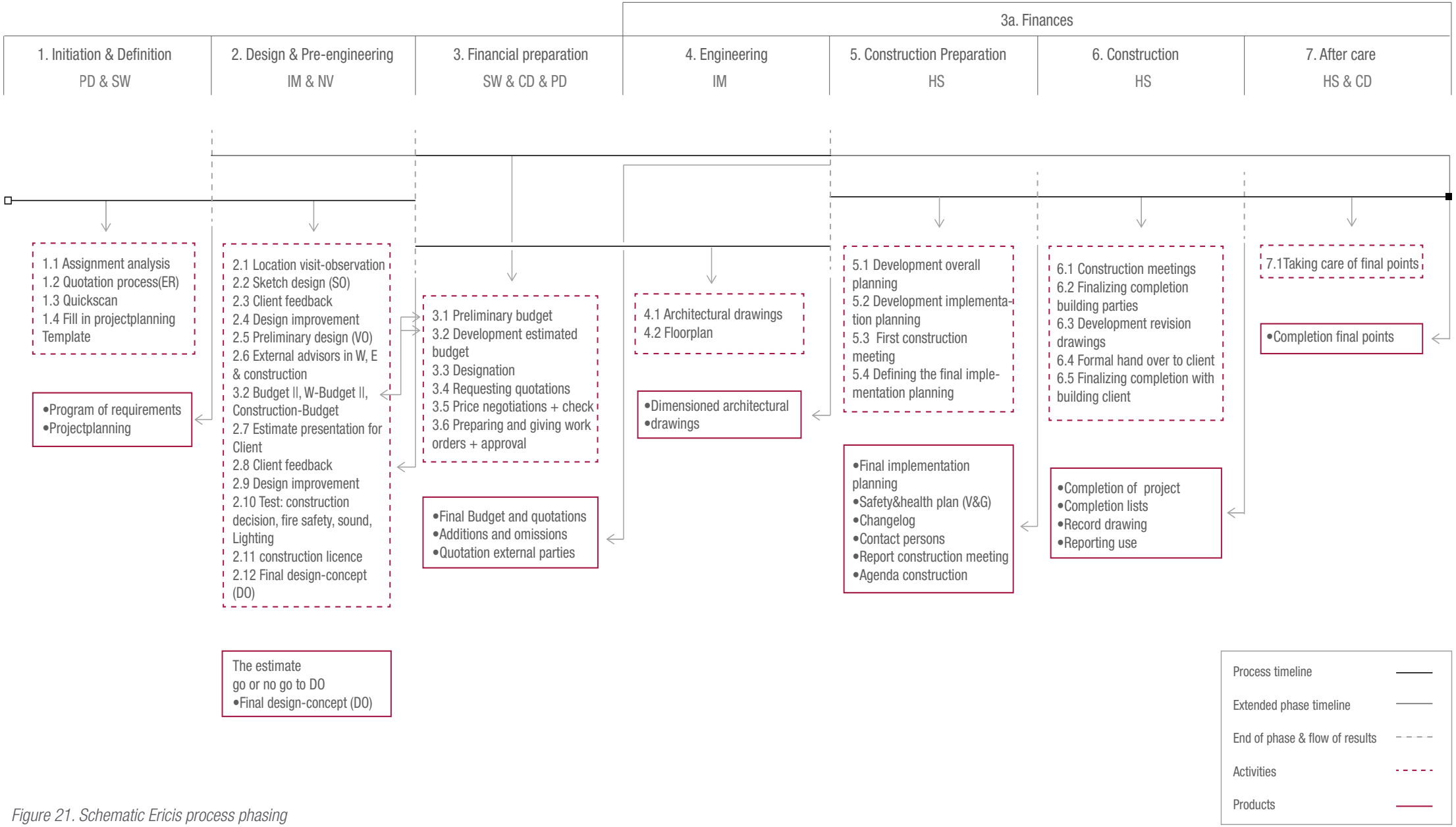

Figure 21. Schematic Ericis process phasing

3.1 THREE CONCEPT PILLARS: DATA, UI & UX

development of the design solution

User interface (UI) & User experience (UX)

In order to define the interface and aimed experience of the app, a research is conducted through the book: about face 3 - the essentials of interaction design. The aim of the app is extremely important in defining and designing the interaction. The interface of linkedin is for example more connected to this app than instagram which has a completely different purpose and is aimed for a different experience.

The aim of the Eri-tool application is to support, accommodate and enhance the management of projects and processes. In general the aim is to create one clear work structure which solves the core problems and is facilitated by the app.

There are certain apps such as instagram, facebook etc. in which you keep scrolling and scrolling, you completely zoom into the app and become distracted from any other activities you were performing. The Ericis app is not for entertainment purposes or whatsoever, it should not distract the users from their work. This app should be clear in regards to the pages and data. This app should be completely focused on the data. Although the app should be content focused, the users do have to enjoy working with the app etc. If the app does not have any appealing elements the users will be less willing to use it which counteracts the aim of this tool.

This application will be used on both a phone and a computer. The primary input method is a touchscreen and the secondary input methods are a keyboard and a mouse. “An input method is the way users interact with the product” (Cooper, 2007). The application is the main form factor with which the user daily interacts.

The computer is the secondary form factor which is recommended to use when filling in the templates due to its ergonomic benefits for this activity.

Once the exact aim of the application is defined together with elements such as the form factor etc. the wireframe also known as an interaction framework can be designed. The wireframe is basically a sketch of the interface. This interface visualisation is very simple, see figure 22. The interface is roughly sketched by creating rectangles at specific places on the empty application pages which indicate specific control components such as icons. Minimalism is key when designing the wireframe, these frames are free from colors, images, logos and any other aesthetic design components. The aim of sketching the interface is to create an abstract version of the application pages, it is basically the skeleton of the final designed application. The wireframe shows where specific components are places. These wireframe is designed based on the user experience, the content and the aim of the application for the user, see figur 22.

An important page which most likely will be used on a daily basis by the user will not be places on the top of the page due to its ergonomic inconvenience. The user will have to hold his or her phone in a less ergonomic position. This application should be as convenient as other apps that the users use on a daily basis such as whatsapp. Therefore these important control components will have to be placed at the bottom the page. Less important and less used components can be placed at the top of the page. Deciding which component will be more or less used is decided based on the content of the pages connected to these components.

The horizontal order of the control components is less based on content and more based on standard orders of applications. There are none to maybe a few applications in which the homescreen component is on the right side of the page, this component is in most applications on the bottom left side of the page. The wireframe is designed based on these valuable factors such as content and application standards. The design of the wireframe is accommodated by UXpin which is an online wireframe design platform.

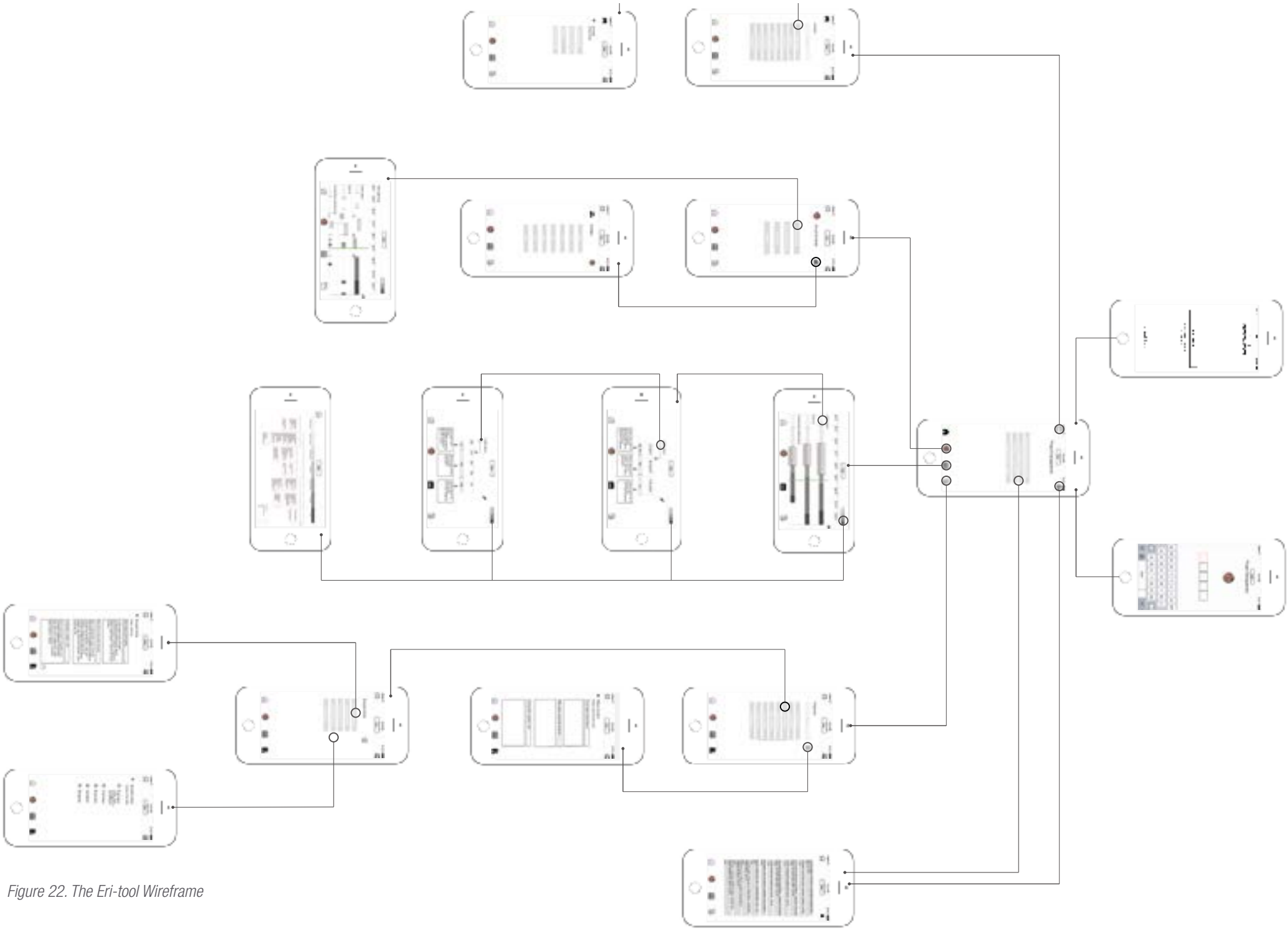

Figure 22. The Eri-tool Wireframe

3.1 THREE CONCEPT PILLARS: DATA, UI & UX

development of the design solution

Interface User test

The interface of the app is important for the user experience. The user experience is important for the usage of the application which again is important to solve the core problems. The wireframe is designed based on the results of the study. In order to discover how the users experience the interaction with the interface; whether it is hard or easy and if all the information can easily be retrieved, an interface user test is conducted.

In order to test the user interface the actual wireframe, which does not contain colors and other visual design details, is used, see figure 23. The test was a one on one session with one user at a time. Within the test each wireframe (of each application page), visual in an iphone wireframe, was printed and presented as an actual page of the application in an iphone, by placing all these elements in context the users can actually envision the scenario of using the product.
There were several specific tasks that had to be conducted by the users based on clear instructions.

User test questions (UserTesting Blog, 2012)

1. a.Look for your personal tasks
   b.Look for information regarding already finalised projects
   c.Look for the general visual phasing where all the running projects are visible.
   d.If you could move one element on any of the pages, what would you move, and where would you place it.
2. What would you like to see differently?
3. Think of 3 things you'd want to find on this page, and try to find them. Which was the most difficult to find?
4. What features are missing?

Some of the users had to first explore the app and did not immediately know where to find what, however others completely understood the interface.

Eventually some icons visually changed in the design as well as certain page details. The request of adding documents to the product has not been added due to its conflict with the online Ericis service which serves for the purpose of storing data. Furthermore the users were positive regarding the interface.
View the results in Appendix E.

User test conclusion

Based on the outcome of this user test several modifications were made to the wireframe which resulted in the visibile wireframe.

Once the application has been used the user immediately knows where to find what information. Other elements are modified such as the visual design of certain icons. The user input is extremely valuable for the development of the product. The design is modified to the users their wishes and perspective however this has to be in line with the design requirements and the assignment.
In order for the user interface to be effective and engaging the visual properties such as color, typography, form etc. must be defined as such that these effectively communicate behaviour and information (Cooper, 2007). Every visual element therefore has to be defined based on the design requirements and the aim of the final service.

The application is aimed to be a real Ericis service, in order to visually communicate the company's identity, the same color and typography will be applied to the upgraded Ericis website, will be used on the final design. Three color options were communicated to the users which were asked to decide which color the final application should have. The three color options were based on the previous website color etc. and on the new website colors and style, the final option was chosen by the team.

The company's identity is communicated through colors and typography. Next to these visual elements there are the butcons(icons that serve as button) and shapes on the pages. The butcons are aimed to be as minimal as possible, the icons have to be clear enough to communicate what type of content is where however these should not be too notable.
Visuals details are all very minimal and only added where required. Regarding all the visual elements ;noise and clutter is avoided.

Figure 23. The interface usertest

3.1 THREE CONCEPT PILLARS: DATA, UI & UX

development of the design solution

Concepualisation Conclusion

Within this conceptualisation phase the prior created idea is developed into a feasible concept. Studies in regards to the content, interface and experience of the application are conducted in order to define what exact properties the application will contain.
These definitions regarding the properties of the application are based on the assignment, the requirements and the user wishes which were developed in the previous phases.

The data elements and functional elements of the application, the templates and visual plannings, are the most important properties due to the fact that these are required to solve the core problems. Therefore these elements have to be prominent in the app.

Although the content of the app is the most important property, the visual properties are also extremely important. In order for the team to use the application as intended an optimal user experience is required. The users have to enjoy working with the app otherwise surely but slowly they will stop using the the application and the problems it is aimed to solve will be manifested again. Therefore the visual properties are very important to the user experience, however the users should not be distracted by them.
In regard to the colors of the app, these are aimed to be clear so everything is visible and foremost these have to fit the Ericis identity. The renewed Ericis colors: black, grey and dark-pink will be used as the colors of the application, this will give the users the feeling that this is their app and not some developed service that they have to use. The application will look reliable because it has familiar aspects.

Next to the colors also the font will be the same as the Ericis font that is used in documents and on the website, this contributes to personalised feel of the service.

The interface of the application has to be as simple as possible, see figure 24. The users have to be able to easily find information which has to be ordered in a logical way. The butcons(button icons) within the interface are aimed to be as minimal as possible because they should not draw attention from the pages in which the content is aimed to be prominent.
The position of the butcons are based on hierarchy and standards, the butcon that is most likely to be used on a daily basis will not be placed on the top of the page due to its ergonomic convenience. The interface in general should be as minimal as possible and visually communicate trust and the company's identity.
The user experience that should be created is reliability, efficiency, effectivity, ease, personalisation and optimisation.

3.2 FINAL CONCEPT

about the Eri-tool

The Final Concept

Why?

Ericis project management, requested a tool which facilitates and supports their project management process. An internal research showed that there are three core problems which are underlying to this assignment: a lack of: structure, process documentation and a clear task division. These three core problems cause multiple obstacles with which the team deals on a daily basis. Additional literature research is conducted in order to discover how to solve these core problems which are underlying to the assignment. Literature showed that three fundamental project management elements are required: phasing, decision documentation and hierarchical lines. These three elements are the requirements based on which the final concept is created.

The EPM application is a tool that is aimed to guide, support, enhance and optimise the projects and process management within the Ericis b.v. project management department. This tool provides support throughout the management of projects and processes. The application basically guides the user throughout each entire project process.

All the properties of the tool are based on the design requirements which are derived from both the assignment and the conducted studies. Three of the most important requirements are: phasing, decision documentation and hierarchical lines. These are aimed to provide seamless management.

How & What?

The application has a visual planning where the phasings of all projects are displayed which allows the user to have a helicopter view on the projects and discover when and where there may be some critical points or whether and when it is feasible to start a new project etc. This visual planning(phasing) has three levels in which the user can choose to either view the planning per month, per week or per day, each level is connected to the activities that are to be conducted in those phases.

Another part of the application are project pages which contain detailed information regarding several aspects of the projects. There is a distinction between active projects and non-active archived projects. The difference in data of these projects is that an active project is not completed and does not have all project data yet, while a non active project is finalised and contains data regarding the phases, decisions and more important the reflection which zooms into valuable information(for this specific department) which is aimed to educate and develop the team.

Figure 24. The Eri-tool homepage

3.2 FINAL CONCEPT

about the Eri-tool

The application runs on personal profiles, only an Ericis b.v. employee, or anyone else that is authorised by the CEO, is allowed access to the application. The app contains private data which may not be retrieved by outsiders. The Personal profile contains a visual personal planning, information regarding one's responsibilities and personal notes. The visual personal planning is similar to the visual project planning however only contains the tasks of the concerning person and not of the entire team. It is also possible to view the personal pages of the other team members and the team page.

Each person is able to modify the visual planning, the project information etc. Each activity through which the application content changes in anyway, is notified to the users which then are up to date about every detail. This is a seamless way of informing the entire team about any modification. In general this multifunctional tool facilitates the project management process.

The first activity when creating a new project in the application, is creating a project planning with the project planning template. Within this template numerous details such as the hierarchical lines within the project are defined. Due to the fact that this is a relatively small department with quite standard task divisions (each employee has a fixed role in the team), the hierarchical lines are designated by default but can be modified.

The project planning contains fundamental data which is required to run a seamless and successful project, however over the course of the project certain details are most likely to change, therefore the project planning can be modified at all times. Each project phase is conducted through several activities and concluded with a final product. These final products are the results of the phases and are extremely important for the following phases. Before the final products are defined there are decisions to be made which define these product. These decisions are not merely made by the project management team however foremost by the client.

The decision making process is facilitated by a decision document in which the decision points are described together with a conclusion of that phase and an introduction of the following phase. This decision document is created after each phase. The creation of the decision document is facilitated by the decision document template.
The project planning document and the decision document are connected, the information in both documents complement each other.

The application automatically creates a visual project planning once the project is created in the app. This visual planning is basically a phasing of the project, it has multiple detail levels and also contains the activities that are to be conducted in each phase. These activities are linked to the users that will conduct them.

Based on the results of the conducted researches regarding the application content, user interface and user experience, the application is designed. The separate elements are in line with the assignment, requirements, user wishes and literature, however it is important to merge these individual product elements and test whether the aim of creating a personalised project management tool is success.

The final design

The products created in the conceptualisation are the fundamental elements of the application both content; templates & phasings, and interface; wireframe. These products are created based on the results of the research. The final design exists out of these fundamental elements including the visual properties. The details of the final design are defined based on the conducted studies.

The visual properties; the colors and typography, of the application are in line with the corporate identity of Ericis project management. Within the final design the data elements are the most prominent followed by the interface and visual properties. All the elements of the final design have been consulted with the users. The final design elements are therefore no surprise to the users but they are familiar with the content, interface and colors.

Following the final design of the application pages, which are designed in UXpin, are visualised in a flowchart, see figure 25.

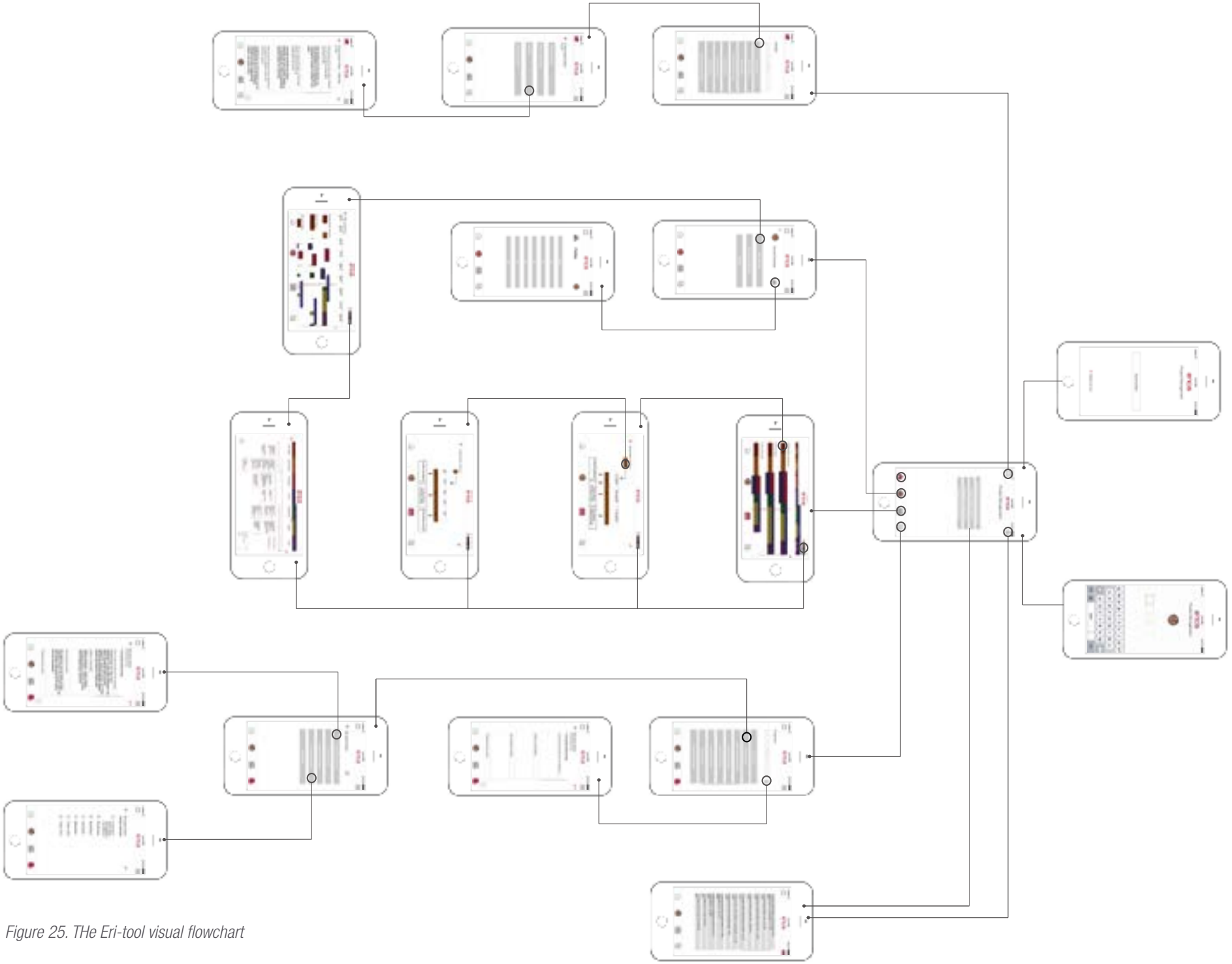

Figure 25. THe Eri-tool visual flowchart

3.3 USER SCENARIO

An Eri-tool user scenario

Following, a user scenario is visible in which the user goes from the homepage to a specific day to day project planning page. This is scenario shows the layers of the plannings and the other pages also exist out of multiple layers which all offer a large diversity of information.

Figure 26. Eri-tool User scenario

3.4 COMPETITOR ANALYSIS

Eri-tool's position on the market

The Eri-tool, is specifically designed for the organisation: Ericis project management. Every function and feature of the tool is based on the needs and requirements of the organisation. Before creating a prototype of the application it is important to discover whether this is even necessary. If there are similar tools on the market which offer the same required functions and features, one of these could be applied to support the EPM team. In order to discover whether there are tools that offer the same as the Ericis application would, a competitor analysis is conducted, see figure 27. This competitor analysis will illustrate where the EPM application is positioned between its competitors and whether the development of this app is actually required or whether it would be better for the organisation to use one of the existing tools. The application is foremost designed for Ericis however based on the variety of features and functions it offers it is aimed to also offer this application on the market and therefore this competitor analysis is extremely important to discover what distinctive advantages this application has over its competitors.
The focus within this competitor analysis is not necessarily on similar applications however on similar tools. The core quality of the EPM tool is not that it's embodied as an application however the quality lies within its features and functions. The fact that this tool is an application does carry advantages however these are not the most prominent advantages in this project. This competitor analysis is conducted based on a selected list of the best project management tools, see figure 27.

Asana

Asana is a task and project management application. This tool accommodates efficient and effective, communication and collaboration (Hillsberg, 2017). Within this tool the user is able to create projects and tasks. Asana offers its users: task organisation, the ability to track the progress of the tasks, real-time updates, notifications and reminders, group and private conversation, attachment of large formats (Hillsberg, 2017).

The two competitive advantages of Asana in regards to the Ericis tool, is that Asana allows the user to upload attachments and to communicate with each other via the application. These are two aspects which have been mentioned by the users of Ericis, however these were not included due to the scope of the project and due to the fact that adding such feature would only decrease the strength of the concept.

Asana has numerous elements which fit the concept of this project and is definitely a strong competitor because of the similarities in qualities. Regardless of the overlap in qualities, the EPM application offers the user a larger variety of qualities because there indeed is a strong focus on tasks however the tool does not only surround the users their tasks. The tool provides in depth and essential information regarding the projects together with the phasings of the projects.

The creation of a new project in the Ericis tool, is accommodated by templates which are carefully designed based on the organisations needs and other requirements. To create a project in Asana, will demand more input and time of the user. Not only creating documents such the project plan etc. however also the tasks. The strength of the Ericis application is that it requires a small amount of input based on which it generates other details. This tool is intertwined with the organisations work structure instead of a completely separate addition to it. One of the less prominent qualities of the application which might be the most interesting is the fact that that is facilitates a continuous learning process of the team. By accommodating the creation of a project archive, all finalised projects are reflected upon and stored so throughout other projects etc., the archive functions as a source of information from which the employees can learn and develop.

This all shows that although Asana is a very strong competitor, however it can not replace the EPM tool because it lacks the diversity, convenience and depth of the Ericis tool.

"An organization's ability to learn, and translate that learning into action rapidly, is the ultimate competitive advantage."

- Jack Welch

3.4 COMPETITOR ANALYSIS

Eri-tool's position on the market

Wrike

Wrike is a project management software tool which accommodates the elements: speed and efficiency, for project management teams (Hillsberg, 2017). Wrike is a strong competitor as it contains similar core qualities with the Ericis tool, such as its user friendly navigation and tasks management (Hillsberg, 2017). The competitive advantage of Wrike is its workload management, this is a very important aspect which helps the users when dealing with numerous activities throughout which there is no clear overview for them (Hillsberg, 2017). Next to the qualities this tool offers, it is very task focused and lacks the diversity and numerous other valuable qualities that the EPM tool contains.

Clarizen

Clarizen is a project management application which is easy to use just like the Ericis application, this is one of its qualities. Another similarity between the applications is the diversity they offer in regards to functions, there is not merely one specific focus. Clarizen offers the user to connect projects tasks, resources, budgets and portfolios (Hillsberg, 2017). One of the features is a personal calendar, which is a feature that the Ericis application also contains. Although there are numerous similar qualities within the applications, the diversity of the Eri-tool is different than the diversity Clarizen offers because not each element of Clarizen is required for Ericis. Therefore, Clarizen would not be of an ideal support to the team. Next to this, there is no continuous learning possibility accommodated by this tool.

Taskworld

Taskworld is a task planning and management application which supports teams in aligning their tasks toward certain objectives. The qualities of this tool are privacy settings, activity logs, project analytics, file sharing etc (Hillsberg, 2017). Its competitive advantage is that it turns abstract ideas into profitable tasks while using the team's capacity. This basically saves the users a step of thinking however this does not necessarily fit the objects of Ericis. Research showed that the team is very flexible and such a feature of a tool might limit their flexibility. The actual thinking process regarding project content, is something that is to be conducted by the team and not by the tool. A large part of the application's qualities fit EPM however the app does not provide all the elements which the organisation needs.

Conclusion

Throughout this competitor analysis merely four competitors were analysed, these were the four competitors out of the top ten that were in line with the EPM application. The others did not contain any competitive advantage or whatsoever towards the tool.Although each competitive tool contained a competitive advantage of the tool, there was not one that could replace the tool or that could be used in place of the application and offer the users the same. Not all requirements or needs would be suffices to. EPM is designed as such that it tackles the requirements and needs of the organisation, while doing so it also contains numerous competitive advantages and qualities which show that once this tool is placed on the market between these successful tools, it would be a valuable competitor and a potential success in the project management segment.

	Eri-tool	*Asana*	*Clarizen*	*Wrike*	*Taskworld*
Archive	■				
Project-driven	■	■	■		
Task-driven	■		■	■	■
Planning	■	■	■	■	■
Personal	■		■		
Staff-driven	■	■	■	■	
Notifications	■				
Reminders	■				
Templates	■				
Convenience	■			■	
Diversity	■		■		
Upload documents		■			■

Figure 27. Competitor analysis

CHAPTER FOUR

PHASE IV

EMBODIMENT

4.

The fourth phase is the embodiment phase in which the concept comes to life, so to say. The concept is embodied in a prototype with which the actual interaction and experience is created. The final user test is conducted with the prototype based on which the final optimisations in regards to the concept and design are made. The users are able to express their opinion and experience with the prototype during the usertest. All the pieces they have invested in this project is finally tangible as the final result.

4.1 EMBODIMENT DESIGN

the tangible concept

Introduction

The EPM application is a tool which improves and facilitates the management of the projects and project process by offering a phasing, hierarchical lines and decision-documentation. The application suffices to all the design requirements such as the Ericis corporate identity. This final phase of the design process is the embodiment of the concept in which the first tangible service is created. The final product is the result of the design process and the solution to the given assignment.

Within the previous phase the concept is developed and designed based on literature. The concept design is developed in detail from content to interface.

Within the interface user test, that was conducted in the concept development phase, the interaction with the application interface was mimicked with paper visualisations of iphone wireframes with the app pages. Although the interaction was imitated it was not even similar to the real interaction with the EPM application. Within this embodiment phase the designed product will be developed into an interactive prototype which contains the data elements, the interface and the visual properties. The prototype only lacks the functional elements (interactive input on the data elements) due to the fact that these require a complex infrastructure which is not feasible to develop in the timeframe of this design phase.

The final user test will be conducted with a prototype, which allows the users to experience the complete product and not a separate part, see figure 28. The users are able to give feedback based on their experience with the application. The user feedback is information based on which the product can be improved and optimised.

Prototype

The detailed final concept, visualised in a flowchart, is designed based on the conducted studies and created products, regarding the content, user interface and user experience of the application.

The concept and individual elements such as the data elements (templates and standard phasing) are quite theoretical and do not completely present the EPM application nor its experience. Although the concept completely describes and displays the application it does not contain the valuable aspects such as the interaction etc.

The application is developed based on an extended design process however it will still require developments once it is applied in practice. The concept is developed into a prototype application which contains multiple features and all the visual properties. The development of this ‘click-through’ prototype is accommodated by Marvel, an online platform that facilitates prototyping.

The prototype of the project management tool is extremely important for the its validation. This tool is designed to accommodate structure, clear task divisions and process documentation in Ericis project management.

User test

With the prototype a final user test is conducted regarding the application, figure 29. This user test is one on one just like the first test, figure 28.

In the user test six scenario’s are sketched which the users (will) most likely encounter.

Six scenario’s

1. The client: Tribes, sees the draft designs in which two floors are visible and indicates that there are two more floors involved in this assignment. You wonder whether you have missed this detail and you look up this information - (project plan via the page of Tribes brussel)
2. You are looking for the daily activities in the design phase of the Newtonlaan project - (visual planning page, two times click through the design phase)
3. You aim to plan a holiday however you don’t know when would be most convenient, therefore you decide to look into the application - (personal profile, visual planning)
4. There is a new tribes project: Rotterdam CS and there are numerous similarities with the finalised tribes project; oval tower. In order to make sure whether you want to conduct this project the same way or not, you search for the information on what went right and wrong in the oval tower project - (retrieve tribes oval tower from the archive and read through the decision-documents and reflection)
5. You have been off for a few days and you you want to look up the latests updates and changes - (view the home and notification page)

- You are free to visit any page of the application that you would like to visit
- What is your impression of the application and what elements would you like to see differently?
- Are there missing aspects which you would like to see in the app?

The user has to imagine and place him or herself in that situation and act upon it. Based on that situation the user has to search for certain information in the application.
One of the aims of this test was to discover whether the users are able to connect these situations, they encounter on a daily basis, to the data and features of the application. Another aim of this session was to discover how the users interact with the application and whether the intended experience is achieved. Last but not least is the user's personal view on the application and all involved properties.

The first question regarding the phasing is effortless conducted by almost the entire team. This is due to the fact that they have seen the interface before so it was clear for them to connect certain required information to the data in the application. The users easily looked for certain data on certain pages.

Multiple user provided feedback regarding the visual properties of some pages. Certain pages such as the project page contained quite small buttons which was an ergonomic discomfort because one finger touches two buttons and therefore using a button has to be carefully done in order to get the right page. Based on this feedback all the buttons are enlarged. Next to this there was feedback regarding the colors of the phasing which was quite neutral in grey tints however in order to make a clear distrincinton of the phases through color this is adjusted aswell into a clear colorful phasing scheme.

Based on the user input and feedback, certain improvements are made to the prototype.

Figure 28. User test with the actual prototype

Figure 29. The Eri-tool prototype - planning page

CHAPTER FIVE
IMPLEMENTATION
5.

Following the design process, an important aspect is required in order to accommodate the users as much as possible. This aspect is the implementation strategy on how to implement and integrate the Eri-tool within their organisation for an optimal user experience. Without a proper implementation of the tool, the quality of the tool is in vain. Therefore a simple implementation strategy is defined, which can be regarded as a user manual.

5.1 IMPLEMENTATION STRATEGIES OF THE APPLICATION

apply the Eri-tool to the organisation

The implementation strategy of the app within the EPMorganisation is defined as the internal implementation while the implementation strategy of the app within other potential organisations is defined as the generic implementation.

Internal implementation strategy

The application is developed throughout a thorough design process in which scientific research is applied together with organisational research and co-creation with the users. In order to create a tool which would suffice to the exact needs of the organisation, the conducted studies and sessions with a large user involvement were required.
The EPMapplication is therefore developed based on practical and theoretical design and content elements. According to the conducted design process, which also involved user tests with an actual prototype, the final designed service should solve the existing core problems within the organisation and facilitate their project and process management. However, the tool won't be able to provide the organisation all this when this service is not applied as it should be.
It is essential to correctly implement this tool into the organisation, merely handing this application to the users won't integrate this tool into the organisation as it should. This often occurs once companies hire an agency to develop a service for them which eventually becomes neglected etc., due to the fact that the company did not know how to implement the service correctly for optimal usage.

The implementation plan can be seen as instructions for usage which is given to the user when he or she purchases an item of any sort. No matter how simple certain products are to use there is always an usage instruction provided to the user which shows the correct way of working with the product (which is designed and developed to its optimal capacity).
In order for the users to start using the application, all the active projects have to be created in the app. Creating a project in the app is done via a template in which all details regarding that project are to be defined.

Input of the user, such as the addition of new information, is essential for the operation of this app because the app creates output such as the visual planning, deadline notifications etc. based on the given input. Therefore it is important to update data in the app when this is required and to work as precise as possible when completing the templates whether this is the project-plan template or the reflection template. Basically all the output of the application regarding the different pages such as the personal page, the project planning page etc. is based on the completed project-planning templates. Therefore such a template, which has to be completed by the user when creating a new project in the app, requires a lot of information and therefore almost urges the team to define certain elements such as the hierarchical lines. A lot of the information on the phasing, hierarchical lines etc. is already defined by default, however the user is able to modify this.

This all comes down to the fact that the users initially have to create the projects in the application by completing the project-planning template. From this point on the application provides them with information such as the visual project planning, the personal planning etc. The template information has to be maintained by the users in case of changes in a project or whatsoever.

In order to get the users to actually use the application when they need it, the project managers are responsible to direct the users to the app whenever they start unnecessary dialogues regarding subjects and information that can be retrieved in the app. This is a type of learning in which they are constantly trained to use the app. If this does not happen and everyone remains their habits the supporting tool will be of no support.

The project managers carry a quite prominent role regarding the implementation. It is very important for the project managers to be aware of the responsibilities they carry over a project. Therefore this responsibility, of the entire team using the application, is also carried by the managers. The role of a project manager in a project is to have an overview without being too involved in all the details, unless this is required. The project managers are therefore foremost responsible for the data activity in the application.

This involvement in the application makes it easier for them to guide the other team members to optimally use the tool. If the project managers would not carry any responsibility regarding the app, it could have been expected that they would forget using this tool aswell, let alone guide the others into using it.

These are three simple but important steps to implement and integrate the application in this organisation. The studies have shown that the team lacks hierarchical lines and next to the facilitation of these lines in the application, these are also applied within these implementation steps in which the project manager takes a leading role in the usage of the EPMtool. The managers are free to assign others to take have a certain responsibility regarding the data input in the application.

- First things first: each project manager takes the time to create the projects, which he or she manages in the application.
- The project managers are responsible to refer the users to the application when they are unnecessarily discussing certain subjects and information that can be retrieved in the app. By doing this the users are trained to use the app instead of continuing problem related habits.
- The project managers carry a large responsibility regarding the input for the application such as completing the templates and updating information if required.

Generic implementation strategy

The client and final user of this project is Ericis project management. Therefore the scope of the entire design process from research to final design has been this specific organisation. Prior the steps are discussed on how the final tool can be implemented in this organisation.

The internal implementation is also defined based on the project results. In order to implement a tool in an organisation, certain information regarding that organisation is required because what works for one firm does not necessarily work for the other.

This exact aspect is what makes it a challenge to make a user focused service generic again. The value of developing a generic implementation strategy is that the concept of a supporting tool which facilitates a seamless project management process within organisations, can be applied in numerous other organisations outside of Ericis. This creates an additional revenue stream for the organisation.

Although the application is specifically designed for Ericis project management, the content and features of the app are required by several other organisations that deal with similar core problems as Ericis.

Next to organisations with similar core problems as Ericis project management, there are also organisations that aim to enhance and optimise their project process and eventually their final results. For these organisations the application applies as well. Due to the multi-functionalities of the application it can be applied in multiple situations and for numerous purposes.

The application contains integrated project management fundamentals such as a phasings and hierarchical lines. For Ericis these are integrated in order to solve the core problems the organisation copes with while another organisation might require this tool to break down complex projects into a simple and clear system. The diversity and simplicity of this tool allows it to be applicable in numerous organisational environments.

The following generic implementation steps are basically the same as the internal implementation steps.

- The implementation of this app starts with creating the active projects by providing all information regarding this project as requested in the project-plan template. With all this fundamental data, the pages such as the project planning are automatically generated.
- The most important step which has to remain consistent is one or more responsible employees which execute the inputs and updates in the application. If ever information would be incorrect or missing, all the features of the application have to be reconsidered because every feature is build of off information provided in the templates.
- The ones responsible and involved in the application stimulate the others to use the application on a day to day basis. This is a way of learning during which the tool will slowly but surely become a part of the organisational structure.

With these steps the tool should be implemented into any organisation in no time.

CHAPTER SIX
CONCLUSION
6.

This final chapter is the conclusion. Within this chapter everything converges together and a there is a reflection on all the phases, steps and decisions which leaded to the Eri-tool and other results. This chapter also exists out of honest recommendations in which the following steps for this project are defined. proper implementation of the tool, the quality of the tool is in vain. Therefore a simple implementation strategy is defined, which can be regarded as a user manual.

6.1 CONCLUSION

the end of the project

The fundamental reasons of this project are the numerous difficulties which the organisation: Ericis project management, copes with. The team does not have an overview on all the projects or activities while the number of projects are increasing due to the premium service and products that they deliver.

Although the organisation is relatively successful the team has absolutely no grip on everything that is going on. They are aware of the fact that so far they have been able to manage however they know that once an actual deal breaking situation occurs they won't be able to cope with it. Instead of constantly risking projects to fail they aim to cope with the organisational difficulties and hereby gain control over their management and processes. Based on this situation, they have requested the development of a tool which facilitates the management of their project process as well as the management of all running projects. The team aims for such a tool which can offer them the grip and overview that they are missing in order to gain an actual control over their work and organisation.

The company basically aimed for a tool which offers them grip and an overview regarding the large amounts of work they conduct. A sort of source of reference which consults them throughout their activities. In order to provide these users with a tool that suffices to their aims and needs, merely the brief assignment description won't be sufficient to create a valuable design brief. A tool that facilitates their management and project process can be numerous products or services. However, each of these embodiments can not suffice the the actual needs of the organisation to gain a grip and overview.

In order to discover what it is that the users really need, two studies are conducted. At first the organisation´s situation was studied, by the application of several research methods, in order to define the exact problems that cause the difficulties which the users encounter.

Finally based on the defined problem, a second study is conducted in which literature is applied to discover the solutions to these problems. Based on both studies a design brief was created which contains the design requirements to which the final product and or service has to suffice.

The design challenge was to develop, Ericis X, a supporting projects & process management tool, for the Ericis project development team. The users seek for structure, a clear division of tasks & responsibilities and process documentation. This tool should do so by providing management support regarding the phasing, hierarchical lines and decision documentation of each project.

The research & analysis phase was followed by the design phases: idea generation, conceptualisation and embodiment. Throughout all these phases the final concept is developed and designed.

The EPM application is a tool which guides, supports, enhances and optimises the projects and process management within the project management department of Ericis b.v. This multifunctional application exists out of a personal page in which one´s personal planning can be retrieved with only his or her tasks are visible.

This personal page also contains information regarding one's responsibilities. The application also exists of a project planning page which contains a visual phasing overview of the running projects. The visual phasing is layered and by clicking on a phase the user can zoom into specific activities within that phase from month, to week, to day. The initials of the employee that is assigned to perform a specific activity are also integrated in this visual planning.

The application also includes a project database in which all active projects can be retrieved with all according data from the hierarchical lines of that project to the milestones within that project. Such a project page is created after or within the initiation phase through the app´s project-plan template. This template exists out of information regarding the project phasing, the hierarchical lines etc.

The user easily creates a project in the application by filling in the template. Next to the project-plan template there is also a decision-document template which has to be completed at the end of each project phase. At any time of the project the user is able to modify the template.

The notifications page is designed for the purpose of making sure that everyone can be informed on updates or other progressions of any project. Every employee is able to add, remove and modify information which is following notified to all others which are aware of changes and can easily retrieve this new data. This creates short lines of communication and important information can't be missed by anyone.

The final page of the application is the Archive. The archive is a digital storage for finalised projects. Once an active project is completed this project can be uploaded to the archive where all the project information is stored. Before the project file digitally transfers to the archive a short reflection template has to be completed where the final valuable information is documented regarding the project process and management. The archived documents contain data that allow the users to learn from previous experiences at all times.

Each page is designed based on the design requirements. Only required elements are included in the application, minimalism was key in the concept design and development. The content of the application surrounds the fundamental requirements: phasing, hierarchical lines and decision documentation. Overall this application is designed to create a seamless management process.

The internal research has shown several core problems, a lack of structure, a lack of process documentation and a lack of a clear division of tasks and responsibilities, which are the causes of the numerous problem symptoms that are manifested in the organisation.

The literature research has shown that these exact core problems are caused by the lack of three fundamental project management elements which are: phasings, hierarchical lines and decision documentation.

These three elements are the core design requirements and therefore the tool, EPM application, is developed and designed based on these three pillars.

The lack of structure is resolved by the application of an explicit phasing, the lack of a clear division of tasks and responsibilities is resolved through the application of hierarchical lines and final the lack of process documentation is resolved by the application of decision documentation.

Through the Eri-tool in which these fundamental elements are integrated, the Ericis project and process management is facilitated.

6.2 RECOMMENDATIONS

the next steps

Introduction

Throughout this graduation project there was a specific design objective to develop a project management tool. The design process of creating this tool, existed out of studies, ideation sessions and further concept development steps and user tests. Throughout the design phases a lot of data was discovered and created which both were essential for the development of the project management tool in order for this tool to suffice to the requirements and needs of the users.

This project surrounded a specific assignment which defined a specific scope. The assignment was to develop a tool which facilitates the management of the project process as well as the management of all running projects. The organisation's project process and project management are the scope of this project. Although there was a specific scope, throughout the design process this scope was regarded when required however not throughout every step because it could have limited the final result. Next to this, there are numerous essential aspects that contain valuable information for the design process however not all this information can be retrieved within the scope of the assignment. Therefore there is no strict consideration of the scope throughout the process however once design and engineering decisions have to be made regarding the final results, then the scope is considered.
Although this graduation project is conducted based on an extended design process, there are always aspects which require further development or improvement.

Following two types of recommendations will be discussed. Foremost the recommendations regarding the final result; how this should be developed from this point forward and how this result can be optimised as it is. The final and less prominent recommendations are the once which do not quite touch the scope of the project however which were extremely valuable to the developments in this project and need to be coped with in order to have an optimal user experience

Following, two types of recommendations will be discussed. The recommendations regarding the Application and how this can be further developed and improved and the recommendations regarding the environment in which this application will be used.

Application recommendations

As with most products and services there is always room and or need for improvement and developments The application exists out of two elements, the content and the user interaction, of which the content requires further improvements and the user interaction requires further evaluation.
The content exists out of the templates and the process scheme while the user interaction exists out of the user interface and the user experience. The short timeframe of this project did not allow the application to be optimally evaluated nor did it allow countless re-design sessions. Regardless of these limitations the user has been closely involved in the project process through several user sessions and user tests.

These co-creation and co-reflection sessions were conducted in order to not only create a tool based on their preferences however also to discover what elements regarding the app have to be modified or improved.

Application content recommendations

Ericis content-templates recommendations

The core and fundamental elements of the application are the process scheme and templates. Based on these essential factors, all the required information regarding the features and functions of the app are created.

The templates are developed based on the research results. The users were requested to provide feedback regarding these templates however they did not provide any. The company mentor (Ericis project manager) provided feedback on the templates after the project was finalised, the exact feedback is in the appendix. She added more template-points to some of the templates in order to make sure these are as complete was possible. It can be assumed that with feedback of all the users, the templates can be even more optimised. It is strongly recommended for the entire team to critically look at the templates and develop this further where required. Not only will this improve the quality of the templates but this will also increase the user experience on the long run because every user will be aware of his or her input and this will create a strong sense of identification with this fundamental part of the service.

Ericis process scheme recommendations

Next to the optimisation of the templates another part of the application's content is the Ericis process scheme. This scheme is developed based on the Ercis project process. Although this scheme was aimed to be very generic, user(one project manager) feedback showed that there were activities missing from the phases. Based on feedback this scheme was improved however each improved version resulted in more feedback. Regarding this scheme it's recommended for it to be optimised by the users. They are the ones who execute this process and therefore it can be assumed that they are the most familiar with it. Just as with the templates the users did not provide any feedback with an exception of one project manager.
As mentioned this is a generic scheme and the aspiration was to also create a more specific scheme that zooms in on the activities even more and defines these to each detail however without the user's input, which was requested, this could not be developed. For both schemes it was aimed to use available company information to develop these however due to the lack of documentation there was barely any relevant information available to do so. The next step that is required, in order to optimise the quality and functioning of the application, is the further development of this generic process scheme. The users will less likely experience a lack of the system once this is created as complete as possible. Just like with the templates, each user's input is recommended.

Another important aspect that is not quite elaborated in this project, which also requires the knowledge of the user's, is the specific time frame of a standard project process. The specifications of the timeframe per project phase is an invisible part of the visual project planning. In the visual project planning the phases (derived from the proces scheme) are automatically displayed over a certain time period based on the user's input in the project plan template. The users indicates in the template the completion date of the project and that information together with the process scheme create a visual planning of the phases over a certain time. There might be some projects that are different from the usual and therefore the application always provides the option to modify the default data.
Again this valuable element of the application has to be defined by the users of the project management team.

User interface and User experience recommendations

The user interface is designed based on the aimed user experience and based on the function of the application. The research prior to designing the interface did not merely involve scientific theories however also successful applications with similar functions such as Linkedin. Although these similar applications are analysed, the EPM Application has a unique function which also separates it from its competitors and therefore the conducted user tests were extremely valuable for the design process because based on the users their input, the interface design was improved in order to fit their preferences.

Before the application concept is coded for launch, the interface design has to run through an app developer who is an expert regarding this type of design and is able to optimise the design for an ideal user experience.

It is important for the design to be analysed by a professional app developer who is able to improve the final concept where required. The app developer is also able to determine to what extent it is feasible to develop the digital infrastructure that this concept requires. Based on the expertise of an app professor from the App Academy, Martijn Wuite, it is assumed that this concept is feasible to be developed however the price to do so would be very high. This professor has consulted the student throughout the conceptualisation phase in regards to the activities that had to be executed in order to develop a viable application design.
Due to his lack of availability, this professor was not able to provide feedback on the results of this phase. In order to make sure the design and concept are complete the expertise of an app developer or app professional is required.

The user interface is related to the experience, the user experience is dependent on the interface and content of the app. Based on the merge of these elements and the interaction of the user with the application, the user experience can be determined. Therefore the design of all the elements have to be optimal in order to achieve the ideal user experience.

6.2 RECOMMENDATIONS

the next steps

Application environment recommendations

In order for the EPM tool to optimally offer the organisation the aspired structure, guidance and facilitation throughout their services, it is recommended for the team to evaluate certain specific aspects within the organisation that surround the functioning of the tool.

The application is designed and developed to function optimally within the organisation however the way in which this tool will be applied within the team, largely determines to which capacity the tool is used. The implementation strategy of the application already shows how to integrate the app in the organisation in order to get the most out of this tool instead of it being of no use at all. Next to the implementation there are certain aspects of the organisation which should be optimised in order for the organisation to run completely seamless.

Both the project management as the financial department indicated the difficulties they face regarding additional work that is conducted and the documentation and processing of that work. The users work on a standard template which is to be used when someone has conducted additional work for a certain project.

Although the team has tried several templates already they have yet to find a way to consistently document this information and communicate this to the financial department. It is important for all the users to cooperate once such an additional item is introduced to the team.

With only two out of the six employees actually participating it won't work. Teamwork is viable when implementing new systems etc. because it not everyone participates the system becomes useless.

It is recommended that once the team has developed a feasible template for the additional work, an implementation plan is developed for this template to become an integrated part of the organisation in order for it to be used by everyone. The implementation plan might be even more important than the template itself because without a plan to integrate it, the quality of the template will be useless. Such a template should also accomodate the communication with the financial department which has an important role regarding the financial aspects of the projects however without proper input or any clarity it is hard for this department to work together with project management and conduct certain activities in time.

The final recommendation regarding the organisation is based on a problem which has been mentioned by a former project asistent during one of the ideation sessions. This problem is the lack of transparency which exists both inside as outside of the organisation.

The former user indicated that for example certain information could not be shared with external parties for unclear reasons, this created unnecessary


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6.3 REFLECTION

taking a look back

This project has been my final step towards obtaining my Master of science degree in Industrial design engineering. Throughout this project there were moments during which I was aware of this fact and there were numerous moments in which I was not quite aware of this. This is an exciting moment because I will be entering a new phase and step in my career however also a scary moment because the known educational network which is supported by organisations, professors, experts, professionals, teachers and fellow students will shift into a rather unknown field of being a part of an actual corporations as a junior employee. The advantage is that throughout my educational years I have been integrated within corporations either internally or externally.

These 'real' project experiences have been a valuable part of my development because I was able to work in real scenarios and not merely by theory. My study program existed out of theory which immediately was brought into practise within projects that were executed every semester. This hands-on experience allowed my to make mistake and learn from them. I look forward to my further learning experiences.

For the past months I have been working in a new environment mentored by new people. I have learned a lot within EPMand I am able to develop based on this learning experience.

This company is relatively small compared to the companies in which I've been an intern before. It was interesting to see the work structure in such a organisation together with the obstacles they encounter and how they tackles these as a team. Regardless of the core problems which cause them to experience numerous difficulties, it was impressive to work within such an intelligent organisation which is able to deal with pressure, deadlines and setbacks the way they do and always find a solution or way to approach whatever scenario they face.

I am very grateful for the opportunity to be a part of such an outstanding organisation that delivers outstanding services and products. It was new for the company to have a design engineering intern however they gave me the opportunity to work on the design challenge. I was able to experience their work process and the several development stages that they conduct.

Initially I had to find my way in the organisation because it was very new however once I got familiar I was able to integrate more into the company. Communication appeared to be a very important aspects in such a situation where there are parties with different backgrounds and approaches.

As mentioned in one of the first chapters, the team is extremely occupied with all the running projects and with all the aspects that come along with those projects. Constant extended meetings with the company mentors were therefore not possible however throughout my education I have always been able to work individually so this was not necessarily an obstacle. I tried to be selective with both the mentor- as team meetings by choosing moments in which I presented or discussed my work and asked for specific feedback or whenever I had specific questions throughout the process. Their busy schedules at times took its toll on the project however foremost I tried to plan according to their availability.

The same goes for the amazing mentoring team of the faculties Industrial Design and of Architecture. Both my mentor and chair were very busy running project, courses etc. Together we were able to make the most of the it and once a certain amount of work was conducted that I wished to discuss in person, meetings were scheduled with either the entire team or one on one. I am very grateful for this amazing team in which both professors were able to steer me into new insights and into critical evaluation of the steps and decisions I have made. I enjoyed the fact that within the meetings I had with my mentor and chair we foremost brainstormed regarding work I delivered or difficulties I faced. The mentoring team always triggered me to re-think or re-analyse situation instead of pointing me of what is wrong without any constructive feedback. I have been very fortunate with such mentor teams both within the company as within the TU Delft.

The only less fortunate aspect is that both mentor teams were very busy due to which not everyone was as informed on the project and some of the essential decisions and findings and lastly feedback on document and draft-deliverables were therefore either not or very late provided.

The design process progressed as expected, trial error and improvement and next to that it was important for me to involve the users and always work with the given feedback. This process was different due to the domain and subject however this created a new learning experience which was my exact aim.
I am very proud and happy with the final result of this project. At certain moments it was all one complex puzzle piece however with the expertise of the mentors and hard work I was able to develop a tool of which I am assured that it will contribute to the team and overall enhance and improve their performance and results.

This has been a challenging and interesting project which has allowed me to develop as a design engineering student.

Although this was technically my last project as a student, I will never stop studying and learning. This is merely a start to a career in which I will be solving problems, challenges and other existing assignments through the application of design thinking in order to provide innovative and user-centred solutions that will contribute to shape this industry, corporations, society in general and foremost the concerned users.

"Develop a passion for learning. If you do, you will never cease to grow."
- Anthony J. D'Angelo

6.4 REFERENCES

sources

Astrum People. (2015). Elon Musk Biography: Success Story of The 21st Century Innovator. [online] Available at: https://astrumpeople.com/elon-musk-biography/ [Accessed 3 Jun. 2017].

atlas.ti. (2002). Observational Research - Definition, Methods & Examples. [online] Available at: http://atlasti.com/observational-research/ [Accessed 9 Apr. 2017].

Boeijen, A., Daalhuizen, J., Zijlstra, J., van der Schoor, R. (2014). Delft design guide. Delft: TU Delft.

Bos, J. and Harting, E. (2006). Projectmatig creëren 2.0. Schiedam: Scriptum.

BrainyQuote. (n.d.). projects. [online] Available at:https://www.brainyquote.com/search_results?q=project [Accessed 26 Dec. 2017].

Cooper, A., Reimann, R. and Cooper, A. (2007). About face 3.0. Hoboken, N.J.: Wiley.

Ericis. (2015). Ericis - Over Ericis. [online] Available at: http://ericis.nl/nl/7/over.html [Accessed 14 Sep. 2017].

Groote, G., Hugenholtz-Sasse, D., Klaassen, D. and others (2005). Projecten leiden. Utrecht: Het Spectrum.

Hillsberg, A. (2017). List of 10 Best Project Management Software Tools - Financesonline.com. [online] Financesonline. Available at: https://financesonline.com/list-10-best-project-management-software-tools/ [Accessed 1 Dec. 2017].

Journals.sagepub.com. (2004). Using the Dreyfus Model of Skill Acquisition to Describe and Interpret Skill Acquisition and Clinical Judgment in Nursing Practice and EducationBulletin of Science, Technology & Society - Patricia Benner, 2004. [online] Available at: http://journals.sagepub.com/doi/abs/10.1177/0270467604265061 [Accessed 10 May 2017].

Lego.com. (2017). LEGO Serious Play The Method. [online] Available at: https://www.lego.com/en-us/seriousplay/the-method [Accessed 5 Jun. 2017].

Mymanagementguide.com. (2010). Project Management Methodology: Definition, Types, Examples. [online] Available at: http://www.mymanagementguide.com/basics/project-methodology-definition/ [Accessed 3 May 2017].

Peña, A. (2010). The Dreyfus model of clinical problem-solving skills acquisition: a critical perspective. [online] ncbi. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2887319/ [Accessed 13 Jun. 2017].

Smallbusiness.chron. (n.d.). The Implementation Process of Strategic Plans. [online] Available at: http://smallbusiness.chron.com/implementation-process-strategic-plans-4514.html [Accessed 3 Dec. 2017].

User Testing. (2012). Wireframing Tools and Testing. [online] Available at: https://www.usertesting.com/blog/2012/10/23/wireframing-tools-and-testing/ [Accessed 30 May 2017].

“It’s not the destination, it’s the journey. That’s the dream.”