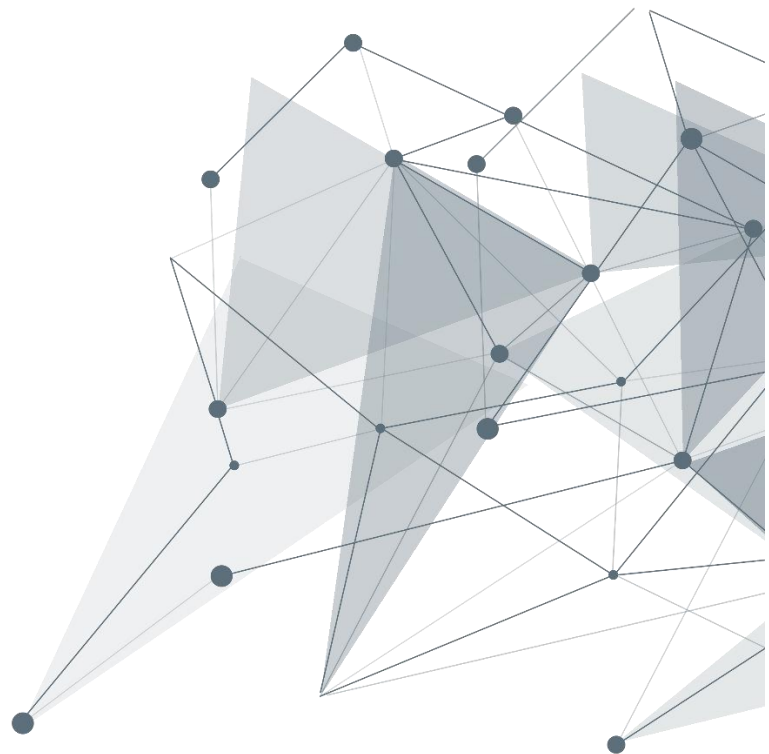# DISSEMINATING DESIGN METHODS

A proposal for how to publish design methods for industry users

Master's Thesis in Industrial Design Engineering

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ABSTRACT

The division of Design & Human Factors at Chalmers University of Technology consists of researchers who have the vision to contribute to making products, services and workplaces designed to enable people to live and work in a meaningful and sustainable way. Over time, the researchers have developed several design methods which are not used in practice to the extent that they want. The methods do not reach users working with design, such as design students and design professionals, as they are intended to. Today, there are no standards regarding how to package these methods to make them available for the industry. Previous research within this field has found that there is a need to create a new design space, where the academical world and practice can meet and communicate.

This project has been performed on behalf of the division of Design & Human Factors (DHF). The aim of this project was to investigate which design methods that were relevant to make accessible for the industry, and how they should be packaged to encourage users to create sustainable and meaningful design. The two research questions that the project answered was:

- Which design methods developed by the division of Design & Human Factors should be made available for the industry?
- How should these design methods be presented and packaged in order to be easy to use and access?

By performing in-depth interviews with researchers and user studies with design students and professional designers, the project provided a suggestion for what design methods should be available, and how to publish them.

The project resulted in a suggestion that DHF design methods that are based on a process model form are suitable to make available for the industry. Process model methods have a concrete work process, is supportive and has a temporal sequence which is desirable for industry users. To help researchers publish their material, a publishing guide was generated in the project. The guide shows all parts that are suggested to be included when publishing design methods such as: clear name, interesting headline, short introduction, prerequisites for using the method, stepwise instruction, a short description of how to visualise the result and decisions, contact information and references.

By using this publishing guide as a base, a suggested concept for publishing design methods called *Design and Human Factors Method Graphic Platform* was created. The platform provides users with design methods which are easy visualised in an infographic. The platform aims to be a design space were users can collaborate, share information and inspire each other. The community will hopefully encourage a changed mindset and an increased willingness to create meaningful and sustainable design. This online platform is a suggestion and a first step when it comes to compiling and publishing DHF design methods into one channel. The online platform and the publishing guide need to be further tested by users.

These project conclusions intend to help the division of DHF in their future work of making their research more available for the users. In the long term, the division has the potential to become a division which is in the forefront when it comes to bridging academia and practice together in order to create good designs.

ACKNOWLEDGEMENTS

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1. INTRODUCTION

This first chapter will give an introduction to the project *background, aim, objectives* and *delimitations*.

1.1 BACKGROUND

The division of DHF at Chalmers University of Technology consists of thirty-six employees dedicated to research within the following areas; *Technology use and adoption, Human -Machine systems, Sustainability and Everyday life* and *User experience*. All researchers have the common vision to contribute to making products, services and workplaces designed to enable people to live and work in a meaningful and sustainable way. Over time they have improved and facilitated design practice by developing several design methods, techniques and guidelines to support their vison. The division DHF has noticed that these methods are not easy to access which has resulted in that many of the methods are not used today. The methods do not reach users working with design, such as design students and design professionals as they are intended to. One reason for that may be that the methods are written by several researchers and they are not collected in one place. Today there is no standardised process for how to package these methods for making them available for the industry.

Previous research within this area reaches the same conclusion as the division. Methods that are used in engineering practice are often perceived as helpful and gainful for the process efficiency and effectiveness, but they are not regularly used and many of them are not accepted (Reiss, Bavendiek, Diestmann, Inkermann, Albers & Vietor, 2017). According to Reiss et al. (2017) users question if the methods lead to an improvement in their design or if they only demand more time and resources. Previous studies show that there are several barriers for designers to apply these design methods (ibid). A few of them are related to issues regarding theoretical descriptions, the complexity of methods, lack of understanding of how to integrate the method into the product development process (PDP) and the limitations of adapting methods to company's situation (Reiss et al. 2017). According to Daalhuizen, Person & Gattol (2013) another reason for the limited usage of design methods in practice, is that they seldom account for all the relevant "real-world" variations that design processes may face in practice. It could be variations in the object of a design activity, for example, the problem, the solution or the challenge. Another variation is the context of a design activity, like variations of the organisation and resources allocated for a project. A third variation is the actors responsible for a design activity, and in this case, it could be a variation of the designer and/or the designer team (ibid). Daalhuizen et al. (2013) also highlight the fact that the designer's initial assessment of the task as well as their "method mindset" affect their use of design methods. When a designer repeatedly uses methods, they get a strengthened method mindset (Daalhuizen et al. 2013).

Today, there exists a couple of alternatives for providing design methods to the industry, such as books and collections, online platforms, communities, mobile applications and videos (Reiss et al. 2017). However, it does not seem to be enough for the industry, and authors within the area search for the answer towards the question of how they can provide knowledge about design methods? Previous research concludes that simple illustrations and notably stories that exemplify the problem help the user to apply a method (Reiss et al. 2017).

This master thesis will collect information from earlier research and add new conclusions from user studies, to achieve a packaging proposal for the division of DHF. The division wants to encourage the industry is using methods for creating meaningful and sustainable design, and therefore their methods need to be accessible. The suggestion will include a solution for how the division can provide their design methods in the future and how they should be packaged to be accessible. By contributing with a holistic proposal of how design methods should be packaged and presented, this project will fill a gap in an unexplored research area.

1.2 AIM OF THE PROJECT

The aim of this project is to investigate which of the division developed design methods that are relevant to make accessible for the industry, which ones that should be revised and which ones that are more suitable for other user areas. The project will also study how these methods can be presented for the industry to encourage them to use them when creating meaningful and sustainable design. The project will give a proposal of how future methods should be packaged to make them accessible for the intended users.

The project will be finished in June 2019, the following research questions will be answered;

- Which design methods developed by the division of Design & Human Factors should be made available for the industry?
- How should these design methods be presented and packaged in order to be easy to use and access?

1.3 PROJECT OBJECTIVES

In order to reach the project aim, the following objectives will be carried out;

- The design methods of the division will be collected and categorized.
- All collected methods will be reviewed by using criteria gathered from literature and user studies with design students and professionals.
- An evaluation of which methods that are ready for being published or which methods that needs to be updated will be made.
- A proposal will be developed, describing how these methods should be packaged in order to make designers use them.
- A concept proposal will be created for visualizing the methods, so they can be collected and reachable for users.
- Guidelines regarding how future methods should be packaged in order to make them available for the industry will be compiled.

1.4 PROJECT DELIMITATIONS

To narrow down the research area, the project will be controlled by following delimitations;

- The project will not consider any other design methods than the methods developed by the division of Design & Human Factors.
- The target group for this project is design professionals and design students.
- The project will result in a proposal for providing design methods and will not be a fully tested and implemented solution.
- Suggested guidelines will be directed specifically towards the division of Design & Human Factors.

2. THEORY

To gain an understanding of what previous researchers had found and to identify a potential gap, a literature study was performed. The purpose of the literature study was also to understand what defines a design method and how a designer can create sustainable and meaningful design.

METHOD DEFINITION

According to Reiss et al. (2017) a method describes a goal-oriented procedure, has a descriptive and instructional format and supports users to fulfil a certain goal. Lindemann (2009) states that a method is a description of a rule-based and planned action to achieve specific activities according to its specification. He adds that methods provide a step by step process to solve a certain problem. He also explains that a method can include the use of several tools in order to fulfil the goal. A method may also describe in which order the tools should be applied. Within product development, there are several different kinds of methods such as analysis methods, idea generation methods, solution finding methods, evaluating methods and economic methods.

A method mindset is according to Daalhuizen, Person, & Gattol (2013) the knowledge, skills and beliefs that a student or designer develop as they learn to use several methods. It is the "mental equipment" that a student or designer must have to be able to use a method to his or her benefit.

THE GAP BETWEEN DESIGN RESEARCH AND DESIGN PRACTICE

Sanders (2017) highlights the fact that challenges in society today become larger and more complex. If the industry can see the benefits of integrating research with design and connecting education with practise there is a lot to gain (ibid). Sanders clarifies that the largest challenge is the "*incompatibilities between how design research is done in practice and how research takes place at the university*" (Sanders 2017, p. 3). Another problem is that the motives for design research are either information-driven or inspiration-driven. "*Designers are often more interested in what will inspire their creative process rather than what will inform the design process*" (Sanders 2017, p 8).

Sanders (2017) suggests two approaches to address the gap between design research and design practice. The first approach handling this issue is building bridges between the two cultures that exist between education and practice. According to Sanders (2017), there are cultural differences that separate these two worlds and those hinder the progress. The second approach is to build a new design space for research that links education and practise together. This design space should include both university and industry concerns and have its own culture, purpose and landscape. Sanders (2017) states that the second approach may be most suitable, and points to the fact that the new design space benefits of having an open culture of sharing. She suggests a framework that describes a new space for design research at the crossroads of academia and practice (figure 1).
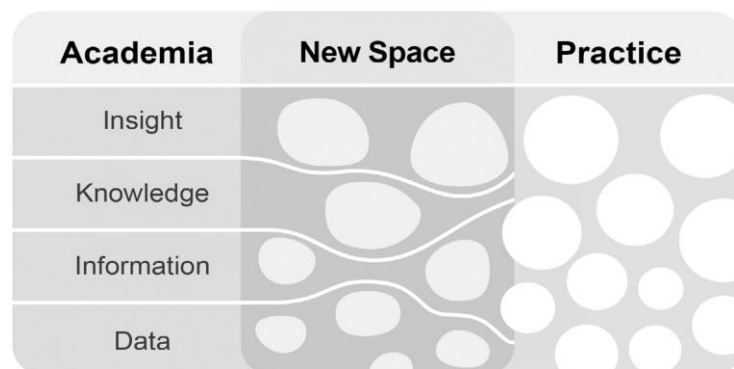

Figure 1. Framework for a new design research space (Sanders 2017).

Sanders (2017) mentions participatory prototyping and other new forms of visualisation as ways of integrating different stakeholders in the design space. Prototyping is one option for exploring, expressing and testing hypotheses about new solutions for the society (ibid).

As mention in 1. Introduction, methods that the academia suggests are seldom used and are not accepted in practice. According to both Reiss et al. (2017) and Üretena, Beckmanna, Schwenkeb, Krausea, & Caoc (2017), the biggest issue is the ability to adapt research methods to typical work practice of a company or personal need. Üretena et al. (2017) highlight success factors that can improve method acceptance. Some of them are understanding industry needs, providing simple and individual methods, convincing and involving people in the work, and training and support. They also mention the importance of continuing education to changing mindset of the users. In addition, practical implementations of design methods, product examples and industry use-cases are also something that can help users accept methods according to Üretena et al. (2017). Users first impression of a method is mentioned to be an important factor for the methods' long-term application in the industry according to Üretena et al. (2017).

Helmer (2015) states that designers tend to be future-oriented and focus on what is new. This may impact their willingness to adapt to previous research. Therefore, one may argue that designers have more difficult to accept past research than other disciplines.
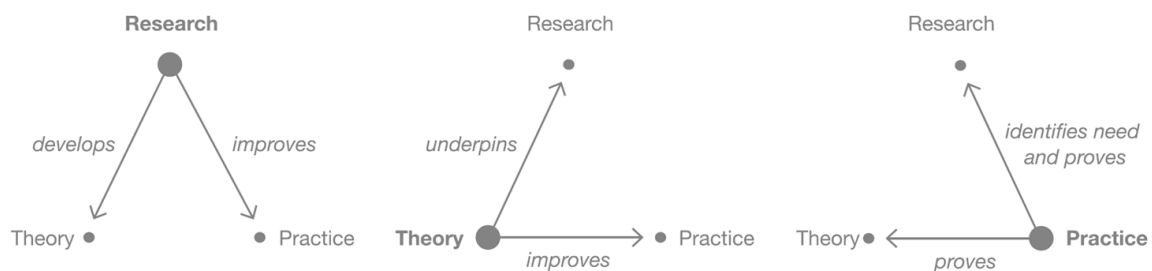
Figure 2. Relations between theory, research and practice (Helmer 2015).

Helmer (2015) states that theory, research, and practice are interdepend on each other (figure 2). He says that *"For example, both research and practice can develop theory, theory needs to be proven through practice, practice can flag needs for research, research can overthrow theory, and research can improve the performance of practice. Research, theory, and practice are not isolated activities, but are tightly interrelated" (Helmer 2015, p. 48).* He further advocates that application of research helps in proving the usefulness of it. First when a research is published it can be user validated and gaps can be identified in the theory. It is important that research is spread to users because it is only then, it can be improved and become more user friendly. Helmer argues that *"research cannot find practical validation if it is never accessed, read, and applied"* (Helmer 2015, p. 49).

In general today's research contains many details and has no proper standard form (Helmer 2015). In addition to these findings, Helmer suggests publishing fewer complex articles in appropriate journals to reach out to users. According to Helmer (2015), a professorial sentence is often long, tangled, obscure, jargonized, polysyllabic, in order to protect its writer from sharp disagreement from others.

Design can be practised within many various contexts, with different problems, possibilities and goals, and therefore there is not only one way to practice design and consider design research (Helmer 2015). According to Helmer (2015), there is a need for building communities of research practice to bridge the gap between research and practice. A problem is the separation of academia and professional conferences, publications or websites, and this leads to isolation of those two.

DIFFERENCES BETWEEN PROCESS MODEL AND CONCEPT FRAMEWORK

The purpose of this thesis is to study how different design methods can be made available for the industry and students. Before investigating this issue, methods of describing different design methods had to be found. Based on the literature, two methods of doing this was found: process model and concept framework.

A process model is according to Nilsen (2015) a model that describes or guides the user in the process of translating research into practice. Process models highlight important aspects that need to be considered in implementation and are often built on several steps that the user shall follow. In a process model a temporal sequence of implementation can be identified which is not found in a concept framework.

A conceptual framework is defined by Imenda (2014) as an outcome of bringing together a number of related concepts to explain or predict a given event, relationship, or give a broader understanding of a phenomenon. A framework compared to a process model consist of limited support for "how-to" carry out the implementation.

SUSTAINABLE AND MEANINGFUL DESIGN

Since product design is one of the most important parts in sustainable product development, it is essential the correct methods are used (Hosseinpour, Peng & Gu, 2015). Product design influences product development from material selection, manufacturing and assembly to product distribution, use, reuse, recycle and disposal (ibid). Sustainable development methods are often used in design processes for evaluating concepts and for making sustainable decisions. Methods and guidelines to support the optimisation of positive social, economic, and environmental aspects in design are important (Eddy, Krishnamurty, Grosse, Wileden & Lewis, 2013). Today environmental impacts are often considered when the completed design is finished even if it is proved that considering it in early stages of the design process, when design direction is more flexible is more beneficial (ibid).

3. METHOD

In this chapter, the work process and methodology of the project will be described.

3.1 PROJECT STRUCTURE

The project consisted of five different design development phases. As seen in figure 3 the process started with an *Introduction phase* and ended with a *Development phase*. Since the project aimed to answer the two research questions defined in the introduction chapter, all activities and deliverables in the project started with them. The circles that are filled represents activities and those that are not filled are deliverables. In this project there was no implementation of the final solution, instead a concept proposal and guidelines for publishing were created. Most resources and time were spent on the phase *Research phase*. Since the aim of the project was to review the design methods and propose a way of package them, it was natural that this phase required more time than the other phases.
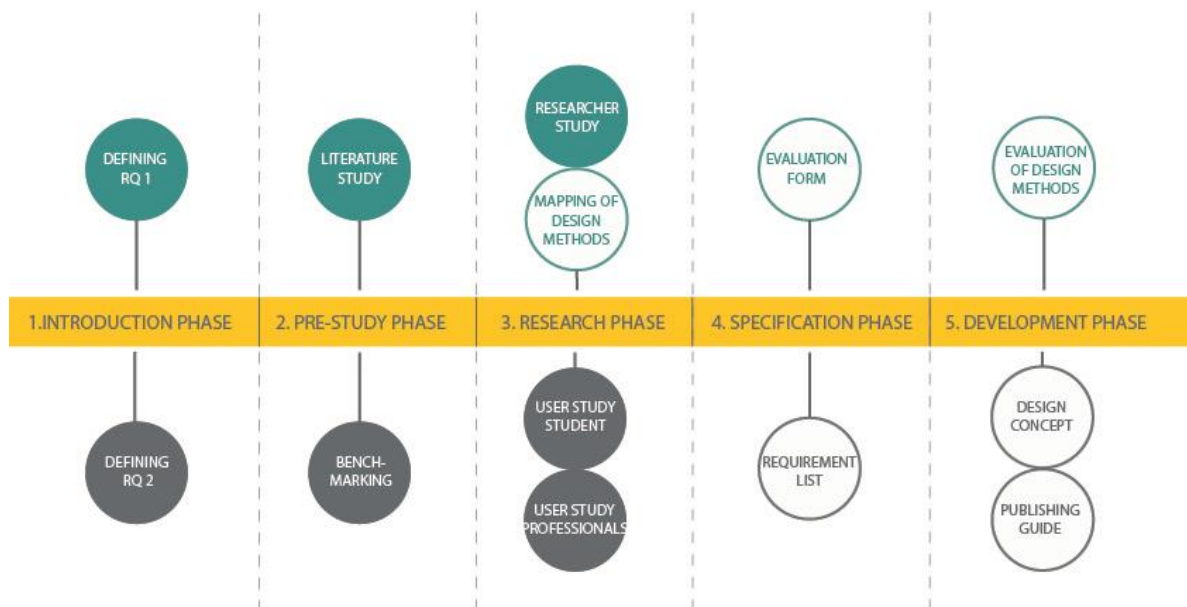
Figure 3. The process followed throughout the project.

Each phase in the design process (figure 3) is based on activities and deliverables explained below.

Phase one, the Introduction phase, focused on understanding the problem and defining the research questions through literature research and questions towards the client. The deliverable in this phase was the project plan.

Phase two, the Pre-study phase, contained literature studies that resulted in a deeper understanding of the problem and provided insights into what previous studies had found. This phase did also result in the development of a framework for evaluating design methods. This phase did also contain a benchmarking session and interviews with communication specialists, for clarifying what had been done in the market so far.

Phase three, the Research phase, aimed to identify and map out design tools, methods and frameworks developed by the division DHF. To achieve this, a researcher study was carried out with researchers at the division DHF who was participating in interviews regarding their research. In addition, the researchers answered questions about their perception of a useful design method and their thoughts about publishing.

Furthermore, the research phase consisted of a user study with students and a user study with professional designers. The student study was performed within a focus group session and an individual survey and aimed to investigate students' perception of a useful design method and its packaging. The professional study aimed to investigate professionals' perception of a useful design method and its packaging and was performed with in-depth interviews.

Phase four, the specification phase, aimed at collecting criteria from researcher studies, user study student and user study professionals into an evaluating form. This form was then used in phase 5 to evaluate design methods. The specification phase would in addition, deliver a requirement list focusing on packaging of design methods which was based on information collected during user study student and user study professionals.

Phase five, Development phase, focused on evaluating the collected design methods against the evaluation form for answering the first research question. The development phase did also result in a final concept for publishing design methods, and a publishing guide for researchers. Which did answer the second research question.

3.2 EVALUATING FRAMEWORK

By doing a literature study about professionals' and students' perception of useable design methods several criteria could be collected. The criteria were divided into relevant areas and an evaluating framework was created. Later the criteria got confirmed by the result of the user studies and further criteria were added to the framework. The evaluating framework was developed into an evaluating form which was used to evaluate DHF design methods. The evaluating form becomes also a part of the publishing guide which was developed at the end of the project.

3.3 MAPPING OF DESIGN METHODS

At the division of DHF, there are thirty-six employees who research within several topics. To get an understanding of what methods these researchers have published, and to get a perception of their thoughts about these, interviews with six of them were performed individually. The interviews were held at their own offices and lasted about an hour. The interviews were structured (Martin & Hanington, 2012) and followed a script of questions to facilitate control and to ease the data analyse. During the interviews, open questions were asked about the participant's research, dissemination of research at the division, and package and publishing of research. The first interview was held as a pilot interview. After this first interview, the order of questions was changed to suit the discussion better. The interview templates are available in Appendix A.

Information gathered at the interviews worked as guidance when collecting and mapping out DHF's developed design methods. To find relevant methods, publications from each researcher at the division were investigated. Publications were found at Chalmers University of Technology homepage: https://www.chalmers.se/sv/institutioner/ims/kontakt/Sidor/Alla-medarbetare.aspx .

3.4 BENCHMARKING

To get an overview of what other organisations and companies have done to make their research available and to get inspiration from their published material, a benchmarking session was performed. The session started with online searches to find competitors. Words as "Design University", "Research companies" and "Research organisations" were used.

Two interviews with communication specialists at two Swedish universities was conducted to get an understanding of their strategy for publishing research. The first interview was made by phone with

an external communication strategist at KTH Royal Institute of Technology. The second interview was made in person with a communication and marketing manager at Chalmers University of Technology.

At Chalmers University of Technology, researchers, teachers and students have the possibility to be supplied by Chalmers Innovation Office when they want to utilize their research. To gain insights into their perspective regarding disseminating research, a in-person interview was made with an innovation advisor at Chalmers Innovation Office.

3.5 USER STUDY STUDENT

The user study student was performed in two parts, a focus group session and a student survey.

FOCUS GROUP

The purpose of user study student was to evaluate design methods together with design students. A focus group was found to be a suitable format for this kind of user study since it is an open environment where participants can discuss their thoughts (Johannesson, Persson, Pettersson 2004). Focus groups are included in what is called a qualitative study were users' soft values regarding a product or service is collected (Johannesson, Persson, Pettersson 2004). It is a limited study consisting of a representative user group of 5-15 participants. The study is based on open questions and discussions in the group. A moderator guides the focus group through the conversations and makes sure it is limited to the specific topic (ibid).

The focus group aimed to give the participants the opportunity to discuss their perception of a usable design method with each other. From this, observations could be made by the moderator. Four students at MSc Industrial Design Engineering was chosen as the user group since they had previous experience of using design methods in their education. The session was limited to two hours, thus the number of methods to evaluate was limited to three. The three chosen methods were selected according to method type to achieve a wide range of reflections. The methods chosen were *Acceptance scale, Modelling kit* and *CARE*. The method called *Acceptance scale* is based on a questionnaire were the participant is answering twenty questions about the interaction with a product or system. The *Modelling kit* method is designed as a practical parlour game where participants are supposed to mock-up service concepts. The *CARE* method is an approach consisting of four triggers of a UX activity that the user considers in four steps. The triggers are Contextualise, Act, Reflect and Express.

The session started with a general survey regarding attitudes towards design methods (for a detailed explanation, see the following section, Student survey). Then each participant received a paper with instructions of the method copied from the original paper. The participants read through the paper and then did an evaluation of the method by filling in an evaluation form on their own (Appendix B). The evaluation form was created based on the evaluation framework in chapter 2. Then the whole group discussed the method by using several questions provided by the moderator (Appendix A). The discussion was recorded. The same procedure was repeated with the second and third method.

STUDENT SURVEY

As a compliment to the focus group, a student survey was performed. The aim of this survey was to understand how design students in general experience design methods and research, how they search for them when they are used and in what context they want them to be published (all questions is found in Appendix A). Since the number of available participants for the focus group was limited the survey was handed out at the focus group session but also sent out online to students. The survey was created in Google drive form and was sent out via Facebook to reach as many participants as possible.

The answers from the focus group and survey were compiled in a summarising result chapter and new guidelines for the evaluating form were gathered.

3.6 USER STUDY PROFESSIONALS

Qualitative studies in terms of seven interviews with design professionals working in the industry were performed in user study professionals. The participants were chosen based on competence, profession and company and a variation of these were desirable. The interviews were performed in-person or through Skype. The aim of these interviews was to understand how design professionals in general experience design methods and research, how they search for them, when they are used and in which context, how they want them to be published (all questions is found in Appendix A).

The findings from the interviews were collected in a summarising result chapter and new guidelines for the evaluating form were gathered.

3.7 PERSONAS AND USER JOURNEYS

To understand the primary- and the secondary user of a potential solution, three personas were made. A persona is a method for capturing common behaviours of a user in a meaningful and relatable profile (Martin & Hanington, 2012). The three personas are based on the findings from the interviews with researchers, design students and design professionals.

To understand how these three users, experience the interaction with a product or service, in this case, the published material, three different user journeys were visualised in Adobe Illustrator (Martin & Hanington, 2012). For the primary users, the user journey visualises positive and negative touch points during searching and using design methods. For the secondary users, the user journey visualises positive and negative touch points during the publishing of a design method.

Both the personas and user journeys were used when evaluating design concepts.

3.8 EVALUATION OF DESIGN METHODS

The existing evaluating framework worked as a basis when the evaluating form for design methods was created. Criteria from the framework were complemented with new criteria from the compiled result collected at researcher interviews, User study student and professionals. The criteria were divided into separate criteria types.

The evaluating form was used when the methods developed at DHF were evaluated. Each method instruction was read through carefully and then the method was evaluated against each criteria in the form. A value from one to five describing how well the method met the criteria was set. One was not fulfilling the criteria at all and five was fulfilling the criteria completely. When all criteria were evaluated the average score of the method was calculated. To analyse the result the six highest scored methods were compared, and common strengths were seen. The six lowest scored methods were also compared, and common weaknesses could be identified.

3.9 REQUIRMENT LIST

The pre-study, user study student and professionals and the benchmarking resulted in a requirement list for the packaging solution. Information regarding packaging and presentation from all studies were compiled and transferred into requirements and guidelines in this list. All requirements and guidelines were weighted from 1 to 5, where 5 is describing the most important ones.

3.10 MOOD BOARD

A mood board was created with the purpose to visually describe the meaning of the chosen design aesthetics such as styles, colours, brands and environments (Martin & Hanington, 2012). The mood board was used as inspiration and guide when developing the final concept. Key words found in the user studies were used for visually describing the aesthetic guidelines for the concept. It was important that the mood board also visualised Chalmers University of Technology graphical profile and brand. The document Chalmers Visuella Identitet (Krång 2018) was used to ensure that Chalmers University of Technology brand was included in the mood board.

3.11 CONCEPT GENERATION

A Morphological matrix was used to generate potential concepts for the packaging solution. When using a Morphological matrix various sub-solution is combined in order to find the most suitable total solution (Johannesson, Persson & Pettersson, 2004). When the sub-functions were listed, several sub-solutions were generated for each sub-function. The sub-solutions were created using brainstorming technique which is a creative method for generation of ideas (Johannesson, Persson & Pettersson, 2004). A Morphological matrix is beneficial when various combinations of ideas shall be created and therefore it suited this project. It is also a method that can be performed by a single designer which was beneficial in this case. With the requirement list as inspiration sub-functions was listed in the matrix. All sub-functions represent a sub-process for the complete process that the solution will fulfil (Johannesson, Persson & Pettersson, 2004). By combining different sub-solutions, various concept proposals were created. The matrix was first visualised on paper and then transmitted into a digital format.

3.12 EVALUATION OF DESIGN CONCEPTS

To evaluate the concepts that had been created in the concept generation session a Pugh-matrix was used. In a Pugh-matrix the selection is based on relative comparisons between different kinds of solutions (Johannesson, Persson & Pettersson, 2004). By using a Pugh-matrix the concepts were evaluated according to all requirements and guidelines in the requirement list. This way of evaluating was suitable because all factors regarding the packaging were then concerned. The factors were weighted from 1-5, where 5 was the most important one. Each concept was then evaluated against a reference concept defined as "Publishing by paper", which is the solution for publishing that is most common used by researchers today. For each criterium, a decision regarding if the specific concept fulfils the criteria better (+1), worse (-1) or at the same level (0) as the reference concept, was made. A total score for each concept was then summarised.

3.13 FINAL CONCEPT

The concept receiving the highest score in the concept evaluation was chosen to be the concept that the project worked further with. The concept was developed in detail by using iterative sketching. The concept was visualised in Adobe Photoshop and Illustrator. The mood board, personas and user journeys and information from user studies were used as inspiration during the detailed development of the final concept.

3.14 PUBLISHING GUIDE RESEARCHERS

Based on information from benchmarking interviews, the evaluating form, and the final concept, a publishing guide for researchers was created. The guide was created using Adobe Illustrator and Microsoft Word.

4. RESULT

In this chapter the result from the mapping of design methods, benchmarking, user studies and evaluation of design methods are presented. Furthermore, the suggested concept for packaging and a publishing guide for researchers is presented.

4.1 EVALUATING FRAMEWORK

The information gathered from the introduction and Pre-study has resulted in a framework for evaluating design methods (figure 4). The framework consists of the five main areas: *Adaptability, Efficiency, Simplicity, Informative* and *Inspiring*. These areas are carefully selected as the most important parameters for accepting a design method. All areas consist of several criteria that Reiss et al. (2017), Daalhuizen et al. (2013) and Üretena et. al. (2017) mentions in their research which is summarised in the background- and theory chapter. These criteria were used in the evaluating process to distinguish useful methods from not useful ones. This framework was used as a basic framework, and new criteria were added from the user studies later in the project.
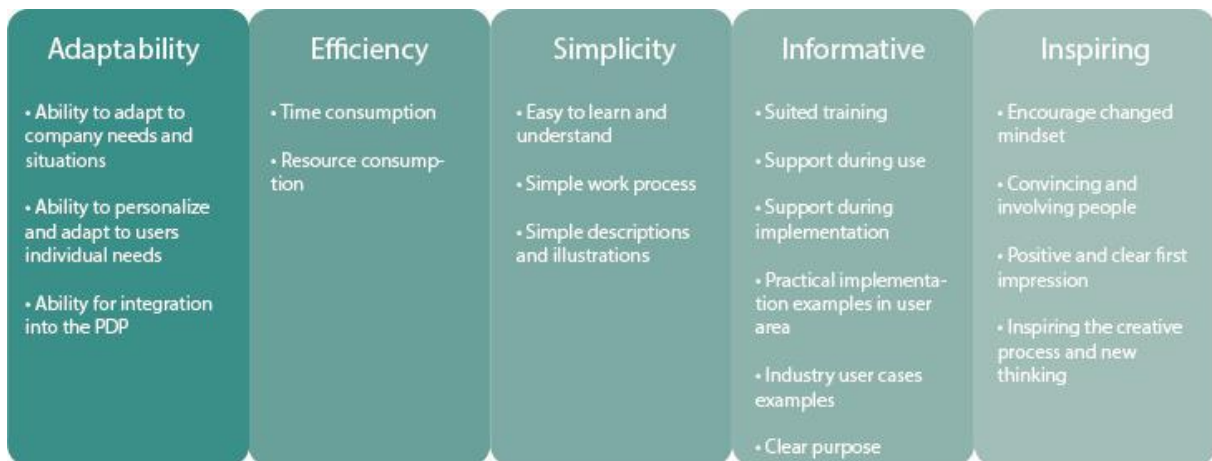
Figure 4. Evaluating framework.

4.2 MAPPING DESIGN METHODS

The mapping of design methods created by DHF was summarised and 34 design methods were collected. 10 of the methods were categorised as process models and 24 as concept frameworks. Figure 5 illustrates how information about the methods was compiled under the headings, method name, author, year, paper, process model/ concept framework, topic, aim, process, image and average score. The complete list of methods is shown in Appendix C.

METHOD NAME	AUTHOR	YEAR	PAPER	PROCESS MODEL/ CONCEPT FRAMEWORK	TOPIC	AIM	PROCESS	IMAGE	AVERAGE SCORE
Tentative Framework	Cecilia Berlin	2011	Ergonomics Infrastructure - An Organizational Roadmap to Improved Production Ergonomics	Process model	Day-to-day ergonomics practice and organizational-relational influences on ergonomics work	Mapping the "ergonomics infrastructure" in an organization	The data collection is organized using the workflow demonstrated in Figure 2 and the stepwise instructions that follow.		2,43

Figure 5. Design method compilation in Excel file.

In the following section, the result from the interviews with researchers at DHF is presented.

Overall perception

All participants in the study agreed that research at the division needs to be more available for the industry. It is only then the division has the possibility to fulfil their vision to influence the industry to create meaningful and sustainable design. The industry does also get to know about competences that the division has, and that collaboration with the division leads to help and development of their company. Hopefully, more companies want to start projects together with the division that leads to growth. The individuals at the division also get strengthened. The participants also mentioned some risks with making their research more available. One risk is that users adapt a method and change it in a too large extent. This could lead to missuses of the method and control may become lost. Another risk is that the division only focusing on working with disseminating research and not creating new ones.

A majority of the participants experienced that their methods are used by others, mostly by students during their education, industrial P.hD. students or by alumni that use them in their work. Students disseminate methods to the industry through student projects and master theses. The result from the interviews shows that participants find it difficult to judge if their methods are used by the industry. They thought that methods have a larger chance to be disseminated through research projects performed together with the industry. When the projects are finished researchers have no longer insights regarding the use of methods. One participant said that it would be easier to judge if the methods are used in the industry if further research had been done within the same area.

Barriers

The participants all agree on that methods and research are not disseminated enough to the industry and potential improvements can be made. The reasons and the barriers for not using the methods described as tiredness of using methods and a negative attitude towards them. Another reason is that people in general, are too comfortable to change tracks and routines when using new methods. To explore new research requires ambition and energy which users in general, do not have according to the researchers. The format in which the article is presented is not easy to use, it is in most cases academical, and that makes it even more difficult for the user. Usually, the research is published in the wrong context and are not communicated in the right channels, which make it hard to reach for the industry. Another reason that the interviewees mention is that the user does not have enough competence to use the methods. In a research project in collaboration with the industry, the company have access to the competence through researchers involved within the limited time of the project. When the project is completed the competence disappears and that can be a problem. The organisation structure and hierarchy are also mentioned as a barrier for the use of methods since the freedom of decision making differs between companies. One interviewee mentioned that he perceived methods to be more used at smaller companies than larger organisations. He further explains that the reason is due to that the design methodology is easier to adapt within small organisations.

Improvements

The result from the interviews shows that the participants agree on that improvements can be done to increase the dissemination of methods. Improvements that were mentioned were; to make the material more interesting, useful, pedagogical and popular scientific. Also, to limit the use of resources allocated for a method. Another improvement is to make it easy to start using a method. Several participants mentioned the ability to adapt the method in education as an important factor that needs to be considered. To highlight the methods in the articles and present them separately is mention as another improvement. One of the participants wants to change the way of naming methods in the research. Today many methods have no name, and researchers are not using the correct words for known terms within the design area, that making it difficult to distinguish within a research area. Researchers also need to improve their communication of the methods and make others understand what they do. Today the division of DHF have no access to the Chalmers University of Technology homepage and are not able to use it for communication.

Researchers also mention that they need to improve the selling of their methods. Overall, researchers are not trained to sell their research, and there is a lack of time allocated for that kind of work. One improvement that facilitates the selling effort is to collect all projects that have used the same methods and present them together. Frequent and long-lasting contact with companies is mention crucial for making them use the methods according to researchers. Another solution is to offer entry versions of the methods to the industry and then develop them further, since too complex methods seem to be difficult for companies to apply. To add a new version of a method that is based on an already existing method that a company use, is mentioned as a way of making the industry use the new method. The research needs to be compatible with companies work processes. It is important that the methods support the companies who use them. Another crucial factor is that the methods deliver a result that the company finds useful, otherwise the company may not use it again or spread it to others. The user needs to be able to make a quick assessment if the method is useful or not.

The choice of topic is also crucial when it comes to disseminating methods. A method within a new and exciting area can increase the chances for success according to the interviews. It is more difficult to develop a method within an area that is already explored. To be the first researcher within an area can increase the possibility of reaching the users.

Packaging and presentation

Another area that was discussed in the interviews was how the methods should be packaged and presented to their users. The result of the interviews shows that changes need to be implemented within this area. One participant mentioned factors as; who is going to use the methods and how are they going to be used, as relevant to consider when packaging methods. How a method is going to be packaged is also depending on the characteristics of the specific method. To presenting a method in various contexts and channels are mentioned as beneficial.

For the industry to be interested to read articles they need to be easy to interpret and understand. The language needs to be adapted to the industry by using their terms. It is beneficial if they recognise themselves while reading. One interviewee suggests providing instruction of the method that are showing real industrial problems, to facilitate the interpretation of the method. Since the industry does not read a lot of research, one other suggestion is to make the information about a method concentrated on one A5paper. A brochure or booklet is easy to distribute to users and may be more interesting to read.

To present research and methods in the right context for example at a conference is also mentioned as a good option. If the researcher is allowed the opportunity to practice the methods at workshops connected to the conferences, it will increase the chances for the method to be disseminated. To provide courses and training sessions is also mentioned as a way of presenting the methods. Several interviewees also mentioned the benefits to talk about the research and try to disseminate it within a specific industrial sector. In general, advertising is not that common at the division, therefore this may be an area for improvements.

One participant talked about a textbook provided by the division that had been used a lot. The method described in the textbook had been used at other universities as well. When providing textbooks with an easy language and understandable text is crucial. One participant said that; "*The advantages with a book are that you can put it in the hand of the user, books are easy to sell, and they are available*". Disadvantages that was mentioned was that books are difficult to promote, and they are not appreciated by everyone. Another participant said that; "*The book must contain a reflective part to become interesting*".

To reach the industry, online presentations are mentioned as an alternative the researchers prefer. Previous attempts have been done to create an online database for "Design for experience" methods, but the need for updating work made it hard to maintain this database. Another opportunity is to use DHF own page at Chalmers University of Technology web page (Chalmers, 2019). To use an existing web page was mentioned as beneficial. Online platforms have the benefits that they are easy to refer to, and the previous material is easy visualised. To show an example of previous projects and statements and recommendations from other companies may increase the trustworthiness of the methods. Online alternatives are easy to find, and they are available. It is room for a lot of information and there are references. The disadvantage of online platforms is that they need to be updated and maintained. The researcher also sacrifices control of the method since it could be spread to someone with bad intentions. One participant had experience of Mobile applications providing design methods. Unfortunately, the user had experienced that they tend to get out of function and crash. The quality is essential.

Another way of packaging method is to create games, kit and inspiration cards (Lockton, 2019). One participant expressed that the researchers need to become more practical when it comes to presenting their work. Since design methods usually are conceptual and theoretical from scratch, there is a need to apply a more practical context. Other divisions at Chalmers University of Technology has been more successful in making their research available, and the reason is that they have something practical to offer. It could be software, industry systems or a new physical material. Other divisions such as "Production System", "Material & Computational Mechanics" and "Product Development" have had the benefit to find their niche, they are working in large groups and have focused their work to one subject. They also work close with the industry and performing continues projects together with the same company. Another crucial factor is that other divisions at Chalmers University of Technology have allocated resources to disseminating their research. They have employed persons that work with communicating and informing the industry about their research. Disseminating research are prioritised and money is allocated to that purpose.

Today, the division does not have any strategy to become more visible towards the industry. It is mentioned as something that is preferred by the researchers. The participants also expressed that a professional marketing plan is needed to communicate and spread information about the division's work. Today, researchers at the division work mostly individual and within the various subject that not are connected to each other. To reach more users the research may need to be directing towards a clear area to show that the division has a special competence that is unique. Disseminating previous research need to be prioritised according to researchers. Today, researchers focus much on finding new projects than marketing previous ones. Another conclusion from the study is that publishing needs to be included in the budget of a project. Publishing is an important factor for making the research available, but it requires resources, either by the researcher himself/herself or through an external company.

ADDITIONAL CRITERIA FOR EVALUATING FORM

The researcher interviews and the pre-study resulted in twenty-eight new criteria for evaluating design methods (table 1). The criteria are divided into different categories depending on which area they concern.

Table 1. Research and literature criteria.

Adaptability	Is able to adapt to user needs and situation
	Is able to personalise
	Is possibility to integrate into work process
	Is possible to adapt to a specific challenge/problem
Efficiency	Is time effective
	Are resource effective
	Contains compressed information
	Highlights important information
Simplicity	Is easy to learn and understand
	Is easy to start using
	Has simple descriptions and illustrations
	Has suitable language for the user
Informative	Supports users during use
	Supports users during implementation
	Has concrete examples
	Has a clear purpose
Inspiring	Encourage a changed mindset
	Are convincing and involve people
	Has a realistic approach
	Inspires the creative process
	Inspires to new thinking
	Touches a new and exciting topic
Visualisation	Coherent visualisation of method and description
	Has a clear visual result
Publishing	Has a package that is easy to use
	Is published in the right context
	Has a clear name
	Is presented in various ways

4.3 BENCHMARKING

The benchmarking session resulted in a compilation which shows how three different companies work with making research available for the industry. They all have inspiring solutions for packaging and publishing research which is presented in the following section called "*Competitor solutions*". In the next section called "*Interviews with communication and utilization experts*", specialists experience of publishing research is described.

COMPETITOR SOLUTIONS

IDEO is a global design company that has developed a platform called "***OI Engine***" that companies can use to collaborate through online challenges using a proven design process (OI Engine IDEO, 2019). This platform can be used both by phones or computers. IDEO also started a community called "***OpenIDEO***" were people worldwide can meet (OpenIDEO, 2018). Furthermore, IDEO has created a website called DESIGNKIT which provides Human-centred design methods like "The five Whys"- the method described in figure 6 (IDEO.ORG, 2019). The presentation of the method includes statistics, a brief introduction and a stepwise instruction. Some of the methods have example videos and case studies.
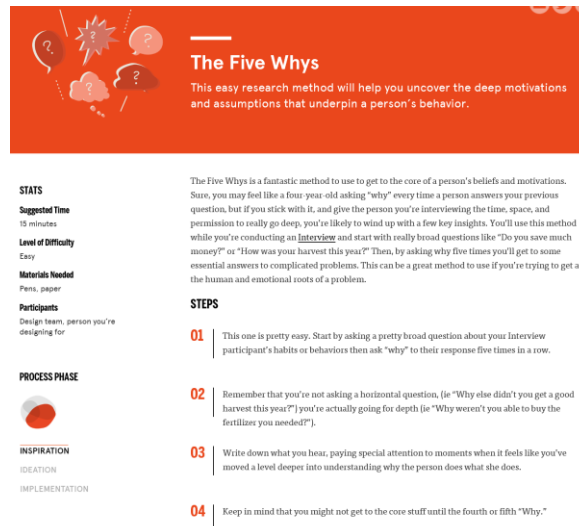
Figure 6. IDEO DESIGNKIT method (IDEO.ORG, 2019).

The faculty of Industrial Design Engineering at Delft University offers a podcast named "***The IDE stories podcast- out of the blue***" (TUDelft, 2019). In 2011 the faculty started an institute called "***Delft Institute of Positive Design***" which offers a variety of collaboration possibilities for everyone in the development /design field. Examples according to their webpage are "*research projects, design projects, consultancy but also a masterclass or an intense workshop where we teach you how to use the latest happiness-driven design tools and methods*" (DIoPD, 2012). The faculty has also created a design research community named "***idStudioLab***". The lab hosts research and *"aims to promote cross-pollination between projects, between research and education, between making and thinking, between theory and design"* (idStudioLab, 2018). In addition, Delft has created a book called "Delft Design guide" which presents an overview of product design approaches and methods (Van Boeijen 2013). This book is used in the Bachelor and Master curriculum at the faculty of Industrial Design Engineering in Delft. In the book, methods are presented as figure 7 shows. The instruction of the method includes a picture, explanation of the purpose of the method, a process description, tips and concerns, limitations and reference information.
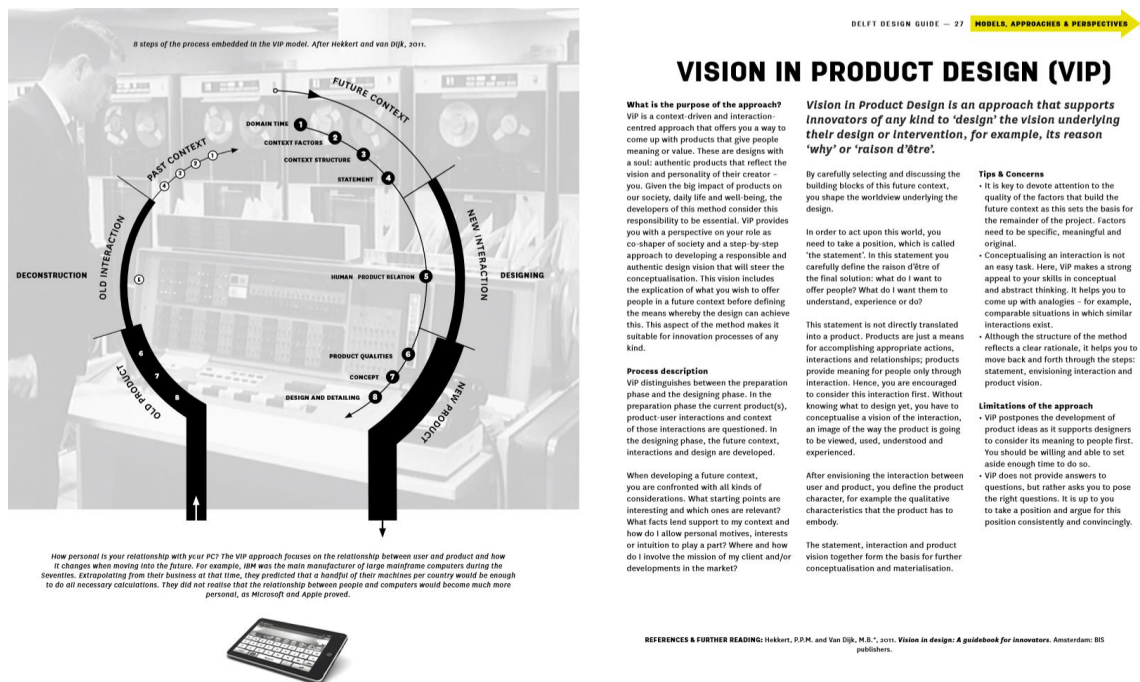
Figure 7. Delft Design guide method (Van Boeijen 2013).

SVID, Swedish Industrial Design Foundation has "worked since 1989 with disseminating knowledge about design as a force for development and a competitive device" (SVID, 2019). They offer both a Journal called "***Swedish Design Research Journal***" and a guide named "***Hållbarhetsguiden***" consisting of methods and material for securing a sustainable Europe for future generations. One example of such a method is found in figure 8. The method description consists of a short introduction describing the method background and purpose and links to further information and template.

Figure 8. SVID hållbarhetsguide method (SVID 2019).

Universities have always worked with disseminating their research. Over the last few years, packaging research has become extremely important, and it is according to the KTH communication specialist a result of society changes which have led to society requires more of the packaging.

In all three interviews with communication specialists and innovation advisors, the need for a strategy for publishing research was highlighted. According to the innovation advisor, it is important to think of the utilisation from the start of a project. If the project is a collaboration between the academia and the industry it is crucial that both parties agree on how their project will impact the society. Mutual interest is beneficial. If they agree on a target vision, it is probably easier for them to accept that both parties also have individual targets. In a collaborative project, it is common that parties start to think of specific activities rather than which impact and that need to be changed. According to the innovation advisor, it is also important that it is an equal commitment between parties in the project.

The three interviewees also mentioned the fact that researchers need to know the target group for their research and understand user needs. The two communication specialists from Chalmers University of Technology and KTH Royal Institute of Technology agreed that to reach the industry the researcher must know what is important for the company. Questions like what those companies want, what type of research are they interested in, and in what purpose will they use it, is crucial to ask before publishing. The innovation advisor explains that "*the industry does not want to know about technical details, they want to know how to solve a problem or how to save money*". The communication specialists also mentioned the importance of using the same channels for publishing that are used by companies. *"The academical world needs to meet the industry through right meeting places"* states the KTH specialist. *"The academia needs also to create something that is perceived as an offer for the target group"* describes the Chalmers specialist. She continues by saying that *"the researcher needs to tell companies which challenges that can be solved"*.

The innovation advisor claimed that for the research to be disseminated there need to exist a motivation and a willingness to spread. The advisor experience that Chalmers University of Technology has a strong culture of cooperation and most of the researchers want to share their findings. Unfortunately, she experienced that researchers often have a problem with understanding how to reach users in the industry, what users need, what market segment to address and what is required from them. The innovation advisor suggested more education for postgraduate students regarding utilisation of research.

According to the KTH specialist, to reach users, the researcher's personal brand is crucial. It is important to sell and market what you as a researcher do. The KTH specialist suggested writing popular scientific and make the material simplistic. If the research touches a new interesting topic, is unique and is entertaining it is more likely that it reaches the industry. The quality of the material is also an important factor according to the specialist.

At the interviews, the specialists discussed different channels of publishing. Webpages were perceived to be useful if they are adapted to the industry and the user can search using keywords that they recognise. Seminars are beneficial for cooperation and for the researchers to understand industry needs. Brochures are not that useful since they get outdated fast. Social media is described as attention driven and momentary and is more useful when it comes to telling the industry that the researcher exist. Movies are a potential alternative, but something must happen, and the message and the result must be clear.

4.4 USER STUDY STUDENT

User study student resulted in new guidelines for the existing evaluating framework and a deeper understanding of students experience of design methods. Guidelines were compiled from the evaluation of three design methods and a survey that design students participated in.

FOCUS GROUP DISCUSSION & EVALUATION

The evaluation form and the discussions about the three different methods gave valuable information about students' perception of how useful the method was. Each method got an average score describing how useful the method was (the complete form can be found in Appendix B). The compiled information from the evaluation forms showed advantages and disadvantages with each method, seen below.

Method 1: Acceptance Scale (figure 9)

Figure 9. Acceptance Scale (for coming).

Advantages

The method is easy to adapt to the work process and it is easy to start using. It has a simple work process and a format which makes it simple to learn.

Disadvantages

The instructions give a few practical examples and have not that much variety in the description. The method does not inspire to a changed mindset or creative thinking.

The method average score is 2,86.

Method 2: Modelling Kit (figure 10)

Figure 10. Modelling kit (Rexfelt 2009).

Advantages

The method is easy to personalise and adapt to different team constellations. The method information is compressed, and the material is easy visualised.

Disadvantages

The method does not give enough support during implementation and does not give practical and various examples. The method is not published in the right context and has no clear name.

The method average score is 2,82.

Method 3: CARE (figure 11)

Contextualise | Act | Reflect | Express

Strive for the personal
Sensitise by pre-assignments
Ground in past experiences

Add contextual cues
The real context, staged, props,
etc., depending on design phase

Enable agency
Avoid presenting "others" use,
make the participant feel like the
intended user

Enable interaction
Even at very early design phases
follow flow of interactions, not only
single interactions

Trigger reflections
By for example drawings of
interfaces, enactment and photos.

Triangulation of data & methods
Cover more of the experience
dimensions by mixing methods, data,
scenarios, participants, etc.

Open ended questions
Be open for unexpected findings

Provide multiple ways
to express
By for example enactment,
interviews and drawings.

Figure 11. CARE approach (Pettersson 2018).

Advantages
The method is easy to adapt to different situations, processes, problem type, and team constellations and is easy to personalise. It also encourages a changed mindset and involves people. The method is informative.

Disadvantages
The method is time-consuming and is not so easy to start using. The language used to describe the method is not simple. Important information in the method is not highlighted enough.

The method average score is 3,20.

STUDENT SURVEY

General attitudes about design methods

In general, design students have a positive attitude towards design methods. They experience that design methods are useful because they are stimulating thoughts and provide insights, sometimes they are fun as well. Methods are inspiring and are perceived as helpful guidelines when working in a design project. A method is helpful when students get stuck in their design work. One student has a bad experience of design methods and only uses them if the student is told to use it in education. The same student mentions efficiency as crucial for using the method. Other prerequisites for using methods according to the students was; limited planning before use, hands-on work process, less universal, ability to adapt the method to the project, limited time-consumption and freedom of use.

Use of design methods

Students were using design methods throughout the design process for structuring data and analysing sequences, getting the creativity flowing in the ideation-phase, generate ideas, validating ideas and to support design decisions.

Some of the participants mentioned that they actively search for new design methods, others do not, and they are sticking to those that they have learned from the education. Those who search for design methods mainly use Google, a website called designkit.com, design books, Chalmers library online, a book called Delft Design Guide or previous papers and reports written of themselves. For methods to reach the students they need to be communicated in a clear way in English or Swedish, either by someone telling about the method or that student have public access to it online. It was also beneficial if a famous researcher is associated with the method. If the method is repeatedly presented in school or on design websites or Facebook groups, there is a higher chance of reaching the student. A majority of the students experience that it is hard to find methods since they do not know where to look for them. If the user does not know the name of the method, it is impossible to find. Also, when the user only has a vague image of what to accomplish or when there is a specific situation it is hard to find a suitable method.

Participants in this survey were also asked what was crucial for them to use the method again and disseminating it to others. All participants agree that a successful result the first time when using a

method is crucial for using it again. It is beneficial if the result is presented in a visual way and that it can be implemented properly. Other factors that lead to repeated use is if the method were perceived to be time efficient, adaptable, providing positive feedback, is quick and fun to use. To be able to spread a method to someone else it needs to be simple enough to explain. The physical presentation of the method is also important when disseminating the method to other students.

Characteristics of usable design methods

In the study students also answered what characterizes a useable design method, compared to a less usable one. A useable method was defined as a method that informs about potential results, is easy to understand, is clear and not too extensive, is adaptable to case or project, covers a relevant area, have a balance between vague and strict, is funny and inspiring, is visually appealing, has a clear process and a clear aim. An unusable method, on the other hand was defined as a method that is time-consuming, has to be done very precise, is boring, is only adaptable to certain cases or under certain circumstances, requires a lot of user participation, are too free or do not allow enough freedom, do not consist relevant content, is repetitive, is ill-defined, are text-heavy or has a complicated process.

Efficient use is mentioned as a crucial factor for students to use a method. In the study, participants answer what an efficient method is. One student argues that the ability to determine if the method is useful for a particular project or not is a crucial factor. That the method contributes to relevant results or insights was mentioned as another factor. Also, the time you need to invest in the method in relation to the achieved result as well as how easy it is to perform in terms of material and participants. One participant says that when using an efficient method "*it should feel like every step is a step forward*". Another student describes an efficient method as easy to understand a no re-reading instructions should be needed since it follows naturally the thinking process of the reader. An efficient method is also adjustable according to the particular task and the quality level of the result is high.

Another factor that is important for a method is that it is easy to understand. In this study, participants gave their opinions on what characterizes a method that is easy to understand. One participant mentioned that a method that is self-explanatory gives the user an opportunity to learn and understand by doing. The method shall not be too complicated, and it should not require long discussions between co-workers about how to perform the method. The method should be clearly explained with simple design steps and visual appealing figures or infographics. That makes the method easy to follow and the instructions get clearer. If the method covers a part of a design area that the user already has knowledge in, it gets easier to understand. The understanding increases if there are examples or case studies in the instruction. It is also important that terms in the instruction are unique and cannot be mixed up with each other.

For a user to understand a method it is important that it gives enough information. Participants in this study describe that when a user of the method feels sure of what, how and why to do something when using a method, it gives enough information. If the instruction provides information about design steps, examples or case studies and how to deviate from them it is an informative instruction.

To capture users, a method needs to be inspiring. According to students, an inspiring method is a method that provides new insights and perspective, has an instruction that is esthetical appealing and colourful, gives examples, have pretty presentations, is unique, provides unexpected results, provides a structure of ideas and is fun and intriguing to use. The way the method is presented affect how inspiring the method is perceived. Different users get inspired by different things. Some people like unstructured, free drawing and some like more structured ways with tables or step by step instructions.

Publishing of design methods

The way the methods are packaged and publish seems to be crucial for their use and how inspiring they are perceived. In the study, students gave their opinions of how methods should be published, and opinions regarding the solution differed. Some students preferred physical alternatives and others wanted online ones.

A method that is published in a book gives confidence and has a certain value. The user can store them physically and do marks in it. One barrier for using books is that it requires that the user actually buy it.

If the method shall be published online the appearance of the website is crucial. The online alternative is more playful and inspiring than books. They are accessible and easy to share with others. Some of the students preferred a digital forum where you easily search for either the name of the method or keywords describing the method. An online library full of methods in where you can filter according to your preferences was also mentioned as a good alternative. Websites with accessible forms are easy and fast to use. Participants mentioned that YouTube tutorials and infographics are appreciated ways to package methods.

Mobile applications were also mentioned to be an alternative since you can take the method with you. Interactive and physical ways of publishing methods have the advantage that the user can test and evaluate without reading a lot. This kind of packaging may be accompanied by an online application in the same graphic design.

Examples of suitable contexts for publishing the methods was Design forums, webpages, design fairs, design conferences, design magazines, inspirational speeches, bookstores, at workplaces and at schools.

ADDITIONAL CRITERIA FOR EVALUATING FORM

User study student resulted in fifteen new criteria for evaluating design methods (table 2). These criteria are shown to be important for students when using design methods. The criteria are divided into different categories depending on which area they concern.

Table 2. Student criteria.

Adaptability	Requires limited preparations
Simplicity	Has a clear work process
	Is simple to explain to others
	Has clear terminology
Informative	Explains how to interpret the result
	Informs where in the process the method should be used
	Informs which result the user can expect
	Gives feedback
	Gives a time estimation
Inspiring	Is unique
	Refers to a well-known person/company
Visualisation	Visual appealing/interesting figures and text
	Playful and interactive content
Publishing	Is easy to refer to
	Is easy to disseminate

4.5 USER STUDY PROFESSIONALS
This chapter presents the result of the interviews with design professionals.

General attitudes about design methods
The general attitude about design methods among professionals is positive. Professionals experience that methods are helpful in the design process and that they increase quality. During interviews, the participants also mentioned that it is valuable to have many methods in mind to choose from. One participant mentioned that her experience of using design methods in her education has helped her handle methods in her professional life. During education, she learned to use a methodical approach which has been useful for her.

Professionals also experience that design methods are hard to apply and that they often need to adapt them to situation, time and resources. One participant mentioned that methods require a lot of paperwork and that they, in general, are better adapted to bigger companies than for smaller projects. Methods require a lot of resources. Users also worry about doing to detailed work when using methods. Sometimes methods do not focus on the right subject for a specific project and therefore the team waste time on unnecessary details.

The result of the interviews shows a difference between the usage of new methods in larger companies in relation to smaller ones. In larger companies, there are processes for introducing new methods. It is often a selected group that is assigned to finding new methods. In smaller companies, it is free for everyone to implement new methods.

Use of design methods
Some participants mentioned that they use design methods through the whole design process. Especially in user-research such as interviews and observations, workshops, meetings, co-creation activities, concept generating and concept testing. Participants working with product development seemed to use design methods more frequently at the beginning of a new product development project to detect risks and evaluate concepts. Participants working with service design tended to use design methods through the whole design process and as a way of involving customers and increase their understanding of a problem. In these situations, the service designer is teaching how to use a design method. One participant says that he does not use design methods that often. Instead, he uses design principles and guidelines to a greater extent.

All participants expressed that it was difficult to find new design methods. Some of them search for methods more frequently than others who delegates the task to a selected project group. This was especially common in larger companies. Participants who search for methods, uses Google, Google Scholar, books, TED-talks or academic contacts to find their methods. Problems they mentioned is that papers are rarely available for them since they have no access to databases. It is also time-consuming to search in a paper since there is often a lot of information in these. The difficulty for users to determine if a method is useful for the company is also mentioned as a problem. To use the correct search words was also mentioned as a problem for professionals when searching for design methods. The language is often technical English which is difficult to interpret for users. Another barrier was the trustworthiness in the research. The user wants to know who the author is behind the research, that is not always clear when searching online.

That someone advocates a method is perceived as a crucial factor for professionals to start using a new method. Personal contact with the author in some way is preferable. Also, to experience the method in its reality is mentioned as beneficial. That can be done in lectures, workshops, events, collaborative projects, education or fairs, and the author is able to describe the context behind the method. That a famous person or a college talks about a method is also a way of introducing a method

to professionals. Some participants use forums, networks and newsletters to discover new methods. A few participants use books when they want to be informed about new methods.

Characteristics of usable design methods

For a design method to be useful for professionals, it needs to be scalable according to existing prerequisites such as time and resources. It needs to be adaptable to different situations and needs. That the result of the method is useful, easy to interpret and are visualised in a proper way is also mentioned as important factors for a usable method. The outcome when using the method should be perceived as better than if the user has not used the method. The method should also provide quick guidance if the user gets stuck. Many participants said that they prefer a clear instruction which stepwise describes a work process. The packaging of the method was also seen as a factor that effects the usability of the method. A useable method is also described as easy, simple and concrete.

For a professional to use the method twice it needs to be fun to use and make the involved participants feel secure during use. It is also important that the users see a noticeable difference in using the method. The method should facilitate users to work and make complex tasks less complex. The method should also save time for the user. If it is possible to iterate the method and get the same result it is more trustworthy, and users are more likely to use it again. One participant argued that it is important that the method add something that the user does not know, otherwise it is unnecessary. The method process and results shall also be able to describe for the management team.

A less usable method is described as a method that is undemocratic and not equal which means that it does not allow the involvement of others in the process. It can also be that the method controls people's thoughts which can have a bad impact. A completely unusable method does not result in any valuable outcome and does not bring the work forward. The user cannot take any decision from the result of the method. A less usable method is also difficult to understand since it consists of incomplete or complex information. It also requires a lot of energy and resources. A method that is unstructured and vague is also described to be less usable.

Participants were asked to define an efficient design method and several factors were mentioned such as the level of competences needed, the ability to instruct the method to others, ability to understand the instructions, ability to adapt method, if it facilitates to take decisions, if it decreases risks, that the result is useful, that it decreases the complexity and makes something easier. That the method saves time, is easy to use repeatedly, is cost-efficient, and do not require too many preparations and after work is also important factors.

During the interviews, participants were also asked what determines a design method that is easy to understand. Participants answered that it needs to be clear what to expect from the method, what the aim is and what kind of value is created. The language also needs to be adapted to the user. If it is easy to follow the instructions and make adaptions the method is easy to understand. It is preferable if the instructions are summarised in some way. The number of choices in a method do also affect understanding. A straight and clear method with questions and decisions is to prefer. Concrete examples are also helpful for users understanding. Pictures can also support understanding. A method that has coherent content is easier to understand than methods that do not.

An inspiring design method is according to the participants a method that consists of real-life stories, and example cases. It is flexible and free, allows users to work on intuition and start wide, is colourful, includes practical elements or forms to fill in, but also if the effects of the result can be seen. The presentation of the method determines how inspiring it is according to the interviewees. Videos and pictures which have people involved are mentioned to be inspiring. Furthermore, interactive methods were the users get going forward is appreciated.

Publishing of design methods

Professional users did have various suggestions for how design methods shall be published. Some of them preferred interactive lectures or workshops where the user can participate and ask questions. Games were mentioned as another interactive alternative that uses found exciting. Others liked instruction movies and TED-talks. Many of the interviewees prefer online alternatives which is easy to spread to others and do not require physical space at their workstation. A mobile application based on a process in several steps was also found to be an alternative. Books and magazines have the benefits that the user can mark and make notes, but they are more difficult to spread to others.

Professional users want to be informed about the design methods through seminars, conferences, magazines, workshops, thesis students, online courses, lectures and networks. One participant mentioned that the range of networks is limited and that she wanted more of them. In general, it did seem to be easier for employees working at a smaller company to attend courses and conferences outside the organisations. Employees working at larger companies seemed more dependent on online alternatives.

ADDITIONAL CRITERIA FOR EVALUATING FORM

User study professionals resulted in thirteen new criteria for evaluating design methods (table 3). The criteria are divided into different categories depending on which area they concern.

Table 3. Professionals criteria.

Adaptability	Is scalable according to prerequisites (time, resources)
Efficiency	Is cost effective
	Requires limited competences
	Requires limited afterwork
	Makes users feel secure during use
	Facilitates decision making
	Decreases project risks
	Decrease project complexity
Simplicity	Generates a result that is simple to explain to others
Inspiring	Allows free thinking
	Contain real life stories
Publishing	Accessible publication
	Credible impression

4.6 PERSONAS AND USER JOURNEYS

Based on the interviews with researchers, design students and design professionals, personas and user journeys were created, describing these user types and their experience with design methods. The complete personas can be found in Appendix D.

The design student is a primary user of the packing solution and will experience it when searching and using design methods. The user journey shows that the students experience in the current situation, is not that positive since the user has a problem with finding methods, understand the methods and interpret result (figure 12).

USER PROFILE- DESIGN STUDENT

Name:	Sam
Age:	25
Type of user:	Primary User
Occupation:	MSc Student
Education:	MSc Indrustrial Design Engineering
Experience:	5 years of studies within design
Frequency of use:	Will use the platform to search for new methods, find inspiration and get guidance how to perform a method

USER JOURNEY STUDENT
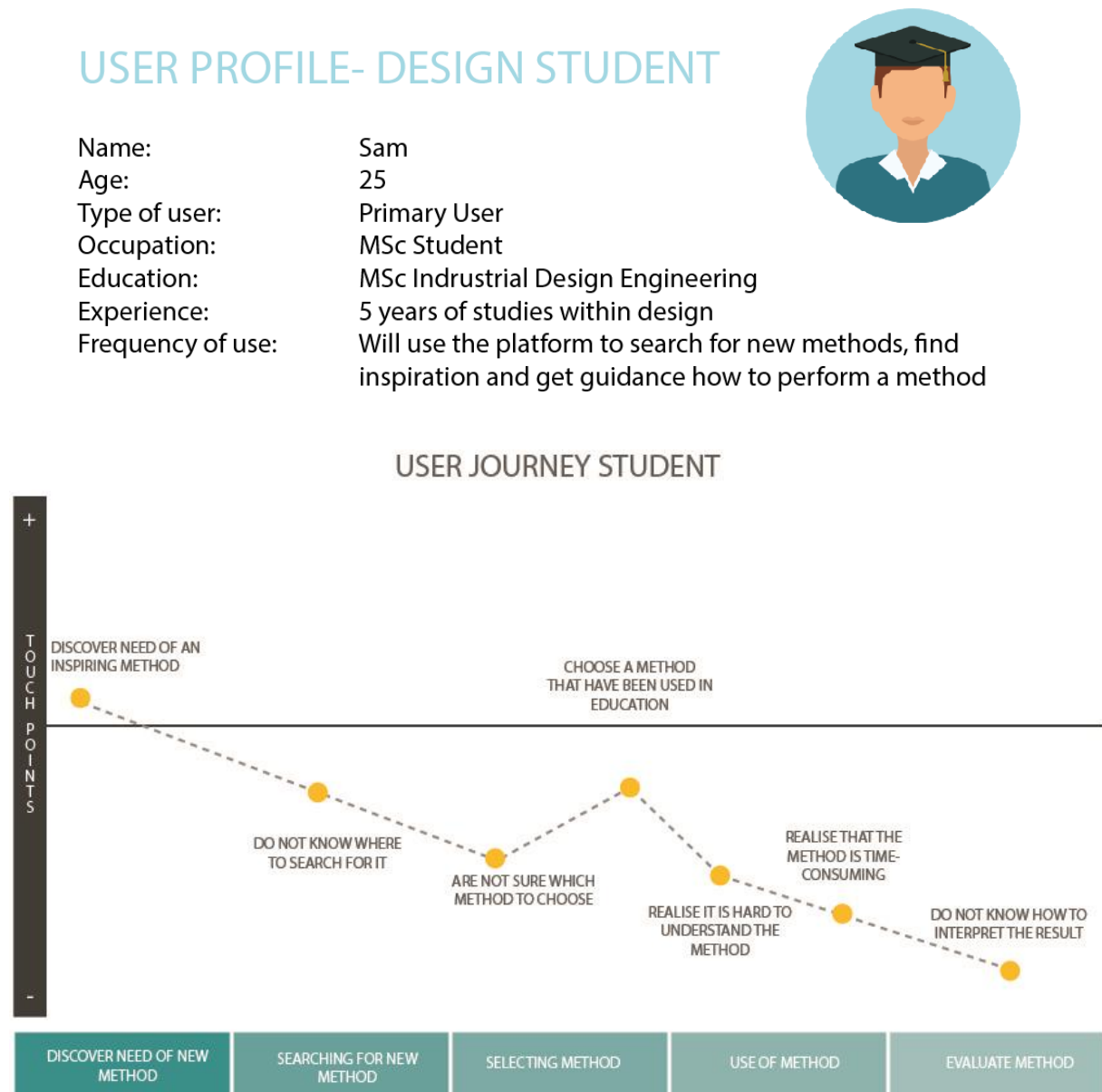
Figure 12. User Profile and User Journey for a design student.

The design professional is also a primary user of the package solution and will experience it when searching and using design methods. The user journey shows that the professional designer's experience is decreasing since the designers have problem with accessing methods, convince others about the methods, adapt methods and trust its result (figure 13).

USER PROFILE- PROFESSIONAL DESIGNER

Name:	Mia
Age:	40
Type of user:	Primary User
Occupation:	R&D Manager Husqvarna
Education:	MSc Product Development
Experience:	10 years of work experince
Frequency of use:	Will use the platform to search for new methods, find inspiration and get guidance how to perform a method

USER JOURNEY DESIGN PROFESSIONAL
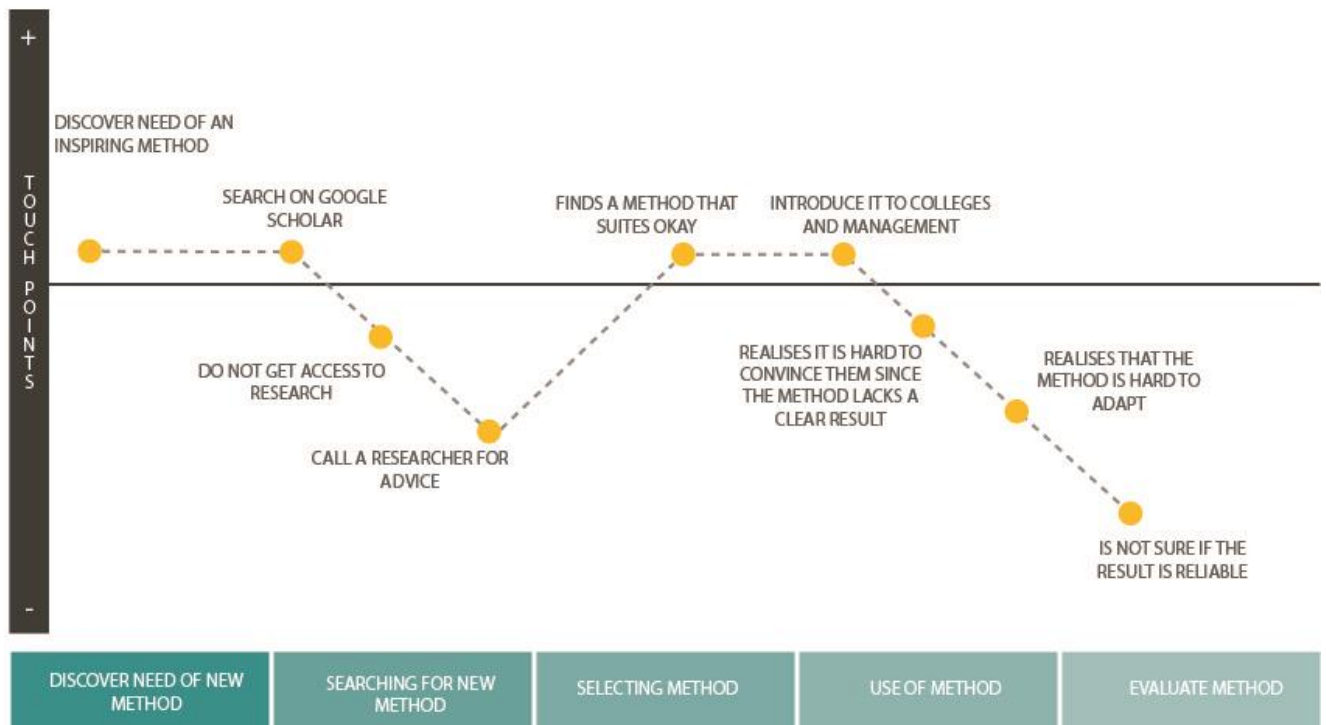
Figure 13. User Profile and User Journey for a design professional.

The design researcher is a secondary user of the packaging solution and will experience it when publishing design methods. The user journey shows that researcher's experience is not that positive since the researcher has a problem with disseminating the research and update the existing ones (figure 14).
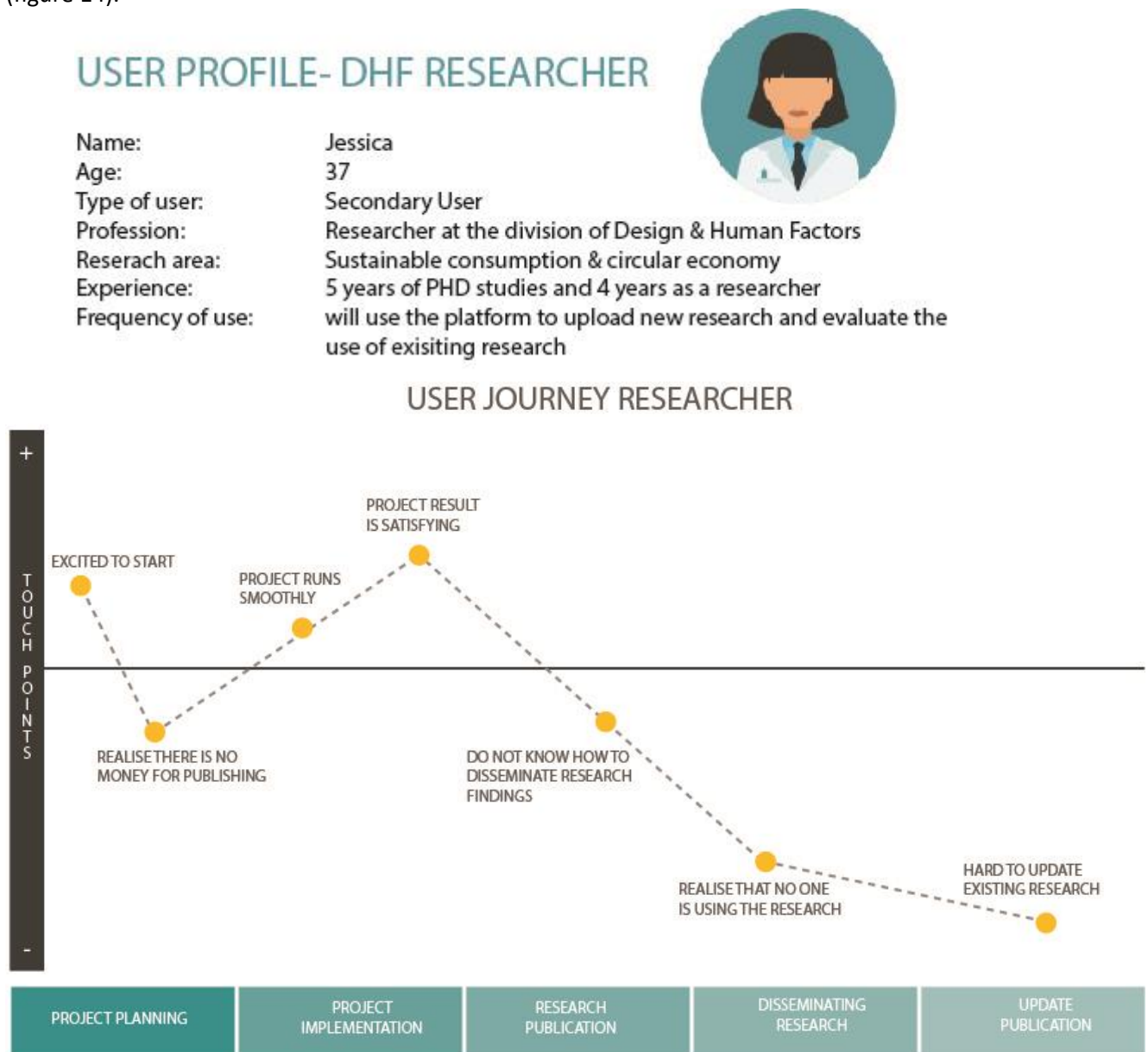
Figure 14. User Profile and User Journey for a design researcher.

4.7 EVALUATION OF DESIGN METHODS

The evaluation form consists of fifty-six criterium which describes a usable design method (figure 15). These criteria are divided into the seven areas; *Publishing, Visualisation, Inspiring, Informative, Simplicity, Efficiency* and *Adaptability*.

Publishing	Visualisation	Inspiring	Informative	Simplicity	Efficiency	Adaptability
Is easy to disseminate	Has a clear visual result	Refers to a well-known person/company	Informs which result the user can expect	Generates a result that is simple to explain to others	Decrease project complexity	Is possible to adapt to a specific challenge/problem
Is easy to refer to	Playful and interactive content	Is unique	Informs where in the process the method should be used	Is simple to explain to others	Decreases project risks	Is possibility to integrate into work process
Credible impression	Visual appealing/interesting figures and text	Touches a new and exciting topic	Explains how to interpret the result	Has suitable language for the user	Facilitates decision making	Is able to personalize
Accessible publication	Coherent visualisation of method and description	Contain real life stories	Has a clear purpose	Has simple descriptions and illustrations	Makes users secure during use	Is able to adapt to user needs and situation
Is presented in various ways		Allows free thinking	Has concrete examples	Has a clear work process	Requires limited afterwork	Is scalable according to prerequisites (time, resources)
Has a clear name		Inspires to new thinking	Supports users during implementation	Is easy to start using	Requires limited preparations	
Is published in the right context		Inspires the creativity process	Supports users during use	Is easy to learn and understand	Requires limited competences	
Has a package that is easy to use		Has a realistic approach	Has clear terminology	Highlights important information	Is cost effective	
		Are convincing and involve people		Contains compressed information	Is resources effective	
		Encourage a changed mindset			Is time effective	
		Gives a time estimation				
		Gives feedback				

Figure 15. Evaluation form.

The result of the evaluation of the 32 methods is visualised in the method scoreboard graph below (figure 16), a more detailed description of the result is seen in Appendix E. Three methods were not possible to evaluate since no instructions were found for these. The six highest scoring methods were Remanufacturing assessment (3,71), PRE-process (3,52), CARE approach (3,52), Acceptance Scale (3,39), CHAI (3,36) and Pathways of sustainable behaviour (3,14). These methods have some strengths in common:

COMMON STRENGTHS
- Clear work process that supports user (step-wise instructions is beneficial)
- Compressed information
- An interactive format that involving people
- Clear name
- Uses concrete examples or quotes from companies
- Suitable language
- Clear purpose
- Appealing visualisation
- Facilitates decision making

The six lowest scored methods were CMSM (1,96), Design procedure for fixtures (2,04), Analytical framework for public transportation (2,09), PU2B (2,14), Framework for aid analysis and design of human-vehicle interaction (2,21) and Design model for preventing waste (2,23). A few common weaknesses were identified:

COMMON WEAKNESSES
- Requires a lot of competence
- Requires preparation
- Contains too much information
- No clear work process, not supporting user
- No coherent and interesting visualisation
- Result difficult to interpret
- No clear name
- No examples
- Time- and resources consuming
- Complex language

The evaluation showed that all methods in the list are easy to adapt, allows free thinking and gives a credible impression. But it also shows that all methods have a problem with their packaging which results in that the methods are not easy to use.
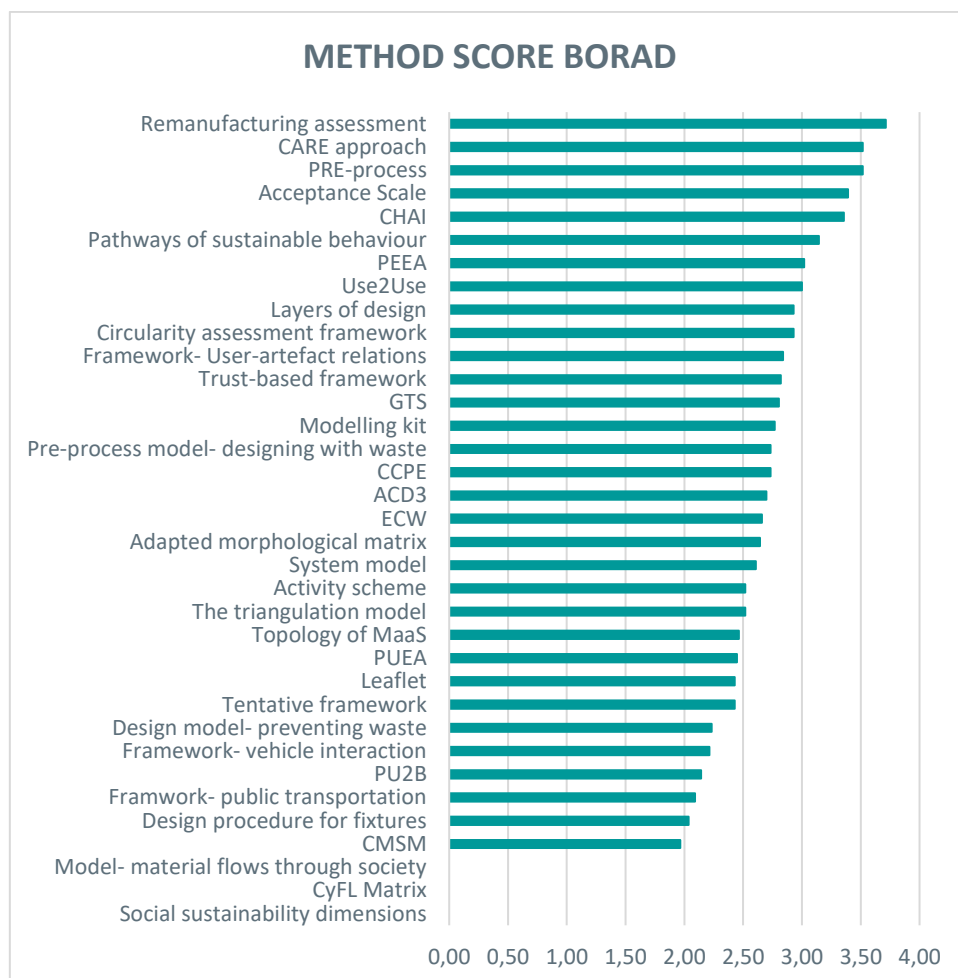
Figure 16. The results from the evaluation of methods designed by DHF.

4.8 REQURIMENT LIST

The requirement list consists of sixty requirements and guidelines concerning the packaging solution. The requirements and guidelines cover the areas *Dissemination, Functions, Adaptability, Information, Intuitive, Inspiration, Interface and Safety.* The dissemination area contains requirements regarding sharing and accessing methods. It also contains requirements connected to marketing, selling and implementation in other forums. This area also involves requirements regarding how to update and add information. The Functions area consist of requirements regarding searching of methods as well as the method ability to support training and highlight important information. The adaptability area focuses on requirements regarding whether the method is adaptable to different work processes, problem and resource conditions. The information area covers requirements regarding information about the method name, result, context, complexity and feedback. The intuitive area consists of requirements regarding an intuitive work process, instructions and results. The inspiration area covers requirements regarding whether the method has an inspiring presentation that encourages a changed mindset, interacting people, gives a positive impression and allows creative thinking. The interface area focuses on the visualization of the interface of the solution that shall have coherent information, a visual theme, be aesthetically appealing and following Chalmers visual identity and communication policy. The safety area covers requirements regarding the published material which shall be safe to use, publish and disseminate. The complete requirement list can be found in Appendix F.

4.9 MOOD BOARD

The mood board visually represent the core words that the final concept will convey (figure 17). These core words are Unique, Fun, Community, Sharing, Simplicity, Sustainable and Guidance. The mood board will also convey Chalmers University of Technology brand. Therefore, are colours from Chalmers University of Technology basic palette represented in the mood board. The palette consists of ten colours which aim to reflect the daily life at the University, and the placement of the university on the west coast (Krång 2018). Chalmers University of Technology brand is also represented by the symbol "Chalmers-node"**.** Which can be seen in the right lower corner of the mood board. The University uses nodes as a way of visualising structures, branches and that Chalmers University of Technology is a multifaceted university with a range between research and education (ibid). It can also be seen as an illustration of collaboration and our relationship with society through innovation and education (Krång 2018). Chalmers University of Technology logotype is also important for the brand and is visualised in the mood board. The University has a sign and a logo. The logo is the text images that say "Chalmers" and the sign is the Avancez-sign. The combination of these two is the combination logo that is used primarily in all external communication in both print and digital media (Krång 2018).

Figure 17. Mood board for package solution.

4.10 CONCEPT GENERATION

In the morphological matrix, nine sub-functions were listed, *Sharing and disseminating, Maintenance of content, Support/instruct user, Adaption according to need, Providing a visual result, Inspires the user, Give user access, Facilitate searching and Marketing/selling/communicating.* At least three sub-solution was generated for each sub-function (figure 18).

SUB- FUNCTIONS	SUB-SOLUTIONS						
SHARING AND DISSEMINATING	COMMUNITES/ NETWORKS	SOCIAL MEDIA	INVITATIONS	LINKS	BROCHURES	LECTURES/ COURSES/ SEMINARS	CONFERENCES
MAINTENANCE OF CONTENT	AUTOMATICALLY FROM PAPER	RESERACH UPDATES	EMPLOYEE UPDATES	CHALMERS UPDATES			
SUPPORT/INSTRUCT USER	LECTURES	INSTRUCTION MOVIES	TEMPLATES	STEPWISE INSTRUCTION	INFOGRAPICS	PICTURES	PERSONAL CONTACT
ADAPTION ACCORDING TO NEED	QUESTIONS THAT SORT	PATHWAYS TO FOLLOW	PREDEFINED OPTIONS				
PROVIDE A VISUAL RESULT	SHOW DECISIONS	GIVES INSTRUCTIONS HOW TO VISUALIZE RESULT	MOVIE/ PICTURES ARE GENERATED	GENERATES A GRAPH OR TABLE	SUMMARIZED RESULT		
INSPIRES THE USER	EXAMPLES/ STORIES	QUOTES	COMPETITION/ GAME	WELL-KNOWN PERSON/ COMPANY	DOING WELL/ BE A PART	VISUALLY STANDS OUT	CREATE AN INTEREST
GIVE USER ACCESS	INVITATION	OPEN ACCESS	SEND OUT TO COMAPNY	COMPANY ACCOUNT	PERONAL ACCOUNT	SUBSCRIBE	BUY
FACILITATE SEARCHING	CATEGORIZATION OF METHODS	EXAMPLES OF KEYWORDS	GUIDING QUESTIONS	SUGGEST WHEN TYPING IN PROBLEM	GUIDE USER TO UNDERSTAND NEED		
MARKETING/SELLING / COMMUNICATING	BOOK	MOBILE APPLICATION	ONLINE PLATFORM	MAGAZINE	PODCAST	YOUTUBE MOVIE	BOARD GAME

Figure 18. Morphological matrix.

Those sub-solutions were combined into fifteen potential concepts (table 4).

Table 4. Potential concepts.

NO	CONCEPT	DESCRIPTION
1	Storytelling book	A book that is sent out to companies consisting of example stories and instructions.
2	Game application	Mobile application that is a game that generates a graph or table when you finish. You have predefined options how to use the method and it is a stepwise instruction to follow.
3	Online infographics	Online platform that suggests method when you type in a problem. The company has an account because they want to be a part and doing something good. The work process is summarized in an infographic and the result gets summarized from that.
4	Visual interesting magazine	A magazine that guides the user to understand their need. User subscribes on the magazine because it is visual interesting. The magazine provides instructions how to visualise the result.
5	Podcast lectures	A podcast that consist of example stories and lectures.

6	YouTube instruction videos	A YouTube videos that creates interest and gives instructions how to use the method.
7	Picture board game	A board game that is visually interesting and supports the user through pictures.
8	Online platform with movies	An online platform with instruction movies.
9	Mobile application database	A mobile application consisting of a database with design methods.
10	Hero board game	A board game where the user is a hero and shall create meaningful and sustainable design.
11	Company project book	A book consisting of short descriptions of company project using design methods.
12	Online platform with games	An online platform consisting of games for users to play online.
13	YouTube movies with stories	A YouTube channel providing stories about company using design methods in their project.
14	Magazine with well-known companies	A magazine with quotes and stories from well-known companies.
15	Online platform with lectures	An online platform consisting of lectures of how to use methods.

4.11 EVALUATION OF DESIGN CONCEPTS

The result from the concept evaluation using a Pugh matrix shows that the concept "Online infographics" got the highest score (table 5). The complete Pugh matrix is seen in Appendix G. All online concepts are top ranked in table 5. Podcast lectures and Picture board game are the lowest ranked concepts by the matrix. As the concept Online infographics suited the requirement list best it got further developed.

Table 5. Concept evaluation with Pugh matrix.

CONCEPT	SCORE
Online infographics	159
Online platform with games	135
Online platform with movies	124
Online platform with lectures	122
Magazine with well-known companies	118
Mobile application database	117
Storytelling book	110
Company project book	110
YouTube instruction videos	102
Game application	94
YouTube movies with stories	86
Visual interesting magazine	80
Hero board game	80
Picture board game	77
Podcast lectures	30
Method in paper (reference)	0

4.12 FINAL CONCEPT

Since the final concept involves infographics, this chapter will start with a short description of what an infographic is. Then the final concept will be described in detail.

INFOGRAPHICS

The definition of an infographic is according to TechTarget (2019) a presentation of information in a graphic format that is designed for making the content easy to understand instantly. The purpose of using infographics is to quickly communicate a message, disseminate information, or simplify a presentation of data and to understand patterns and relationship. Many infographics consist of one or a couple of following components; bar graphs, pie charts, histograms, line charts, tree diagrams, mind maps, Gantt charts, and network diagrams. According to Column five (2019) there exist three types of infographics presentations; Data visualisation, Information design and Editorial infographics. Data visualization is a simple visual presentation of data. Information design presents concepts or other information, such as process, anatomy, chronology, or hierarchy. Editorial infographics are used for mapping an area or show the anatomy of an object. There are also three different formats for how the infographics can be designed, Static infographic, Animated infographic and Interactive infographic (Column five, 2019).

DESCRIPTION OF THE CONCEPT

The final concept is called *"Design and Human Factors Method Graphic Platform"*. The concept is an online platform that aims to connect design researchers, professional designers and design students through a community and a network. The intention of the platform is to provide designers with tools and methods helping them to create sustainable and meaningful design. The platform will work as a forum for designers to discuss, share and influence each other. It is a suitable channel for the academical world to impact the industry and students by providing new research information and methods. Figure 19 shows a flowchart of wireframes describing how a user will interact with the platform (a larger image can be found in Appendix H). The flowchart consists of four levels. Level one is the company level where the user can find the link to the platform. Level two is the *Method Graphic Platform* start page showing different design areas. Level three is a web page showing different design methods within a design area. Level four is an information designed infographic of a chosen design method.
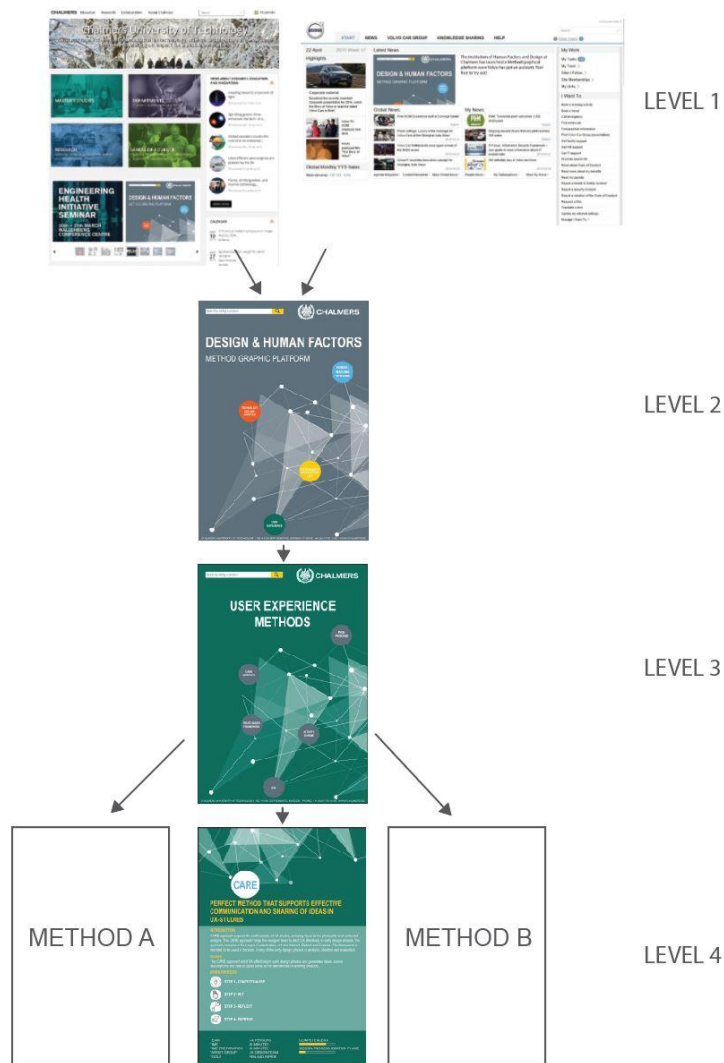
Figure 19. Wireframe flowchart describing final concept.

Only users with an account will be able to use the platform due to safety requirements. At Chalmers University of Technology own webpage, students shall have free access to the platform (level 1). Companies that want to join the community need to purchase an account for the whole company and then employees can create their own profiles. It is beneficial if the company share a link with the platform at their intranet or any other company webpage that employees have access to (level 1). Due to company policies, the access may vary.

When the user has created a profile, design methods can be explored through the platform. If the user has a specific problem to solve or a specific need, the user can search for a method by using the search box. Otherwise, the user can choose one of the design areas that are suggested at the platform and get inspired by new methods (level 2). The design areas are according to DHF four research areas, *Technology Use and Adoption, Human -Machine Systems, Sustainability and Everyday Life* and *User Experience.* This is a suggestion of dividing the design methods into different areas. How to divide the methods have to be further investigated and decided by the division.

Users choose a design area by clicking on the design area symbol. Then the user gets to a new web page showing various design methods within that specific area (level 3). The user has the opportunity to search for a method by using the search box also on this web page. By clicking on a method symbol the user chooses a method to learn more about. When the user has picked a method, an infographic instruction of the method will appear. The information design infographic instruction contains three parts, method start page, method work process and method result. Figure 20 gives an example of how the CARE method (Pettersson, 2018) can be presented as an infographic. The method start page is constructed of a compelling title that describes what challenges that can be solved by using this method (figure 21). The start page will also have a short introduction to the method, describing the aim, result and work process. In the bottom of the start page, there is a general information bar. The bar gives the user fast information regarding the amount of team members required, expected work time, expected preparation time, target group and tools needed. The bar also describes which competence level that is needed, rated from 1 to 5. Lastly, the bar informs in which phase of the design process the method can be used.

The CARE method consists of four pages describing the method's four work steps. The number of pages will vary depending on the method work process. The information in these papers are compressed and the language is written in a pedagogical and easy way.

The last page is the result and decision page which will guide the user to summarise their work (figure 21). For the users in this study, a visual result was important. The user wants to get a result that can be shared with others. The last page can be created in various ways depending on how the result will be presented. In some methods the result is a graph or a table, in the CARE method, the result is a list of UX- activities. In the user studies, the project also found that users wanted to know what decisions that a method have generated. It is beneficial if the user is able to think of that on the final page as well. How the user should fill in result and decisions is described shortly in this final page. In the bottom bar, the user finds contact information to the author and a link to the related paper. There the user can find more information about the method and ask questions to the researcher.

Figure 20. CARE method as an infographic.

Figure 21. Infographic start page and last page.

The idea behind this infographic concept is that users can use the instruction online but also by printing the pages and use the instruction when working in teams. If the user wants to share a method with another user, the link is easy to disseminate. Researchers have also the possibility to print the method in an easy format and give it away to potential users. The format of infographics has several benefits that facilitate the user's ability to assimilate the method. It is visual appealing, consist of compressed information, guides the user in the process and is fun to use.

How the infographics will be created is not decided yet. A suggestion is that researchers themselves create the infographics instruction according to a template consisting of the parts described in the previous section. The template will guide the creator to follow Chalmers visual identity regarding colours, fonts, logo and symbols. The example instruction of the CARE method follows these guidelines. A complement to this template is the research guideline for design methods that are proposed in the next chapter. A template will make sure that the platform interface is coherent and follows a visual theme. To update and create new material in the platform shall be easy, using the template.

For making this community a room for inspiration it is important that users can share their work with each other. A user can share their experience and result of using a method on their own profile by uploading work. Other users can explore these user examples which helps them to understand the method and what result that they can expect from it. When finishing a method, the user has the possibility to rate and review the methods and give feedback to the author. To share experience may make users more interested in creating good products and services. At the user profile, the user gets information about which methods that are finished by the user. It will also suggest new methods to try.

4.13 PUBLISHING GUIDE RESEARCHERS

This publishing guide for design methods shall guide researchers when planning, developing and publishing design methods. The material is based on the result from benchmarking and user studies.

The publishing guide aims to help the researcher to package a design method that has a clear work process. Such a method is categorised as a process model. When DHF design methods was compiled many of them turned out to be concept framework methods. For making these methods available for the industry the project suggests to further develop them in to process models. The findings from user studies shows that users want a clear work process and guidelines when using a method. Since a concept framework lack a concrete instruction for the work process and implementation, such a design method is not optimal for an industry user. A concept framework may fit an academical user that want to dig deeper in a research area but unfortunately not an industry user. This guide focusing on process model methods.

PLANING FOR PUBLISHING

When planning a project, it is important to consider how the result will be published. Following aspects may be taken under consideration:

- How the result will impact the society
- The target group of the project result
- How the method can help users with their challenges
- In which context to publish the method
- Time plan and a budget for publishing and utilization

DEVELOP METHOD

During the development of the method, consider the criteria in the evaluation form (table 6). The criteria concern either the method or the instruction of the method, which are distinguished in the column "type". Make comments on how to improve the criteria that are not fulfilled.

Table 6. Evaluation form for developing design methods.

Think of if the method or instruction…						
Area	**No.**	**Criteria**	**Type**	**Yes**	**No**	**Improvements**
1. Customized use	1.1.	Is able to adapt to user needs and situation	Method			
	1.2	Is able to personalise	Method			
	1.3	Is possibility to integrate into work process	Method			
	1.4	Is possible to adapt to a specific challenge/problem	Method			
	1.5	Is scalable according to prerequisites (time, resources)	Method			
2. Effective use	2.1	Is time effective	Method			
	2.2	Are resources effective	Method			
	2.3	Is cost effective	Method			
	2.4	Requires limited competences	Method			
	2.5	Requires limited preparations	Method			
	2.6	Requires limited afterwork	Method			
	2.7	Makes users secure during use	Instruction			
	2.8	Facilitates decision making	Method			
	2.9	Decreases project risks	Method			
	2.10	Decrease project complexity	Method			
	2.11	Contains compressed information	Instruction			
	2.12	Highlights important information	Instruction			
3. Understanding	3.1	Is easy to learn and understand	Instruction			
	3.2	Is easy to start using	Method			
	3.3	Has a clear work process	Instruction			
	3.4	Has simple descriptions and illustrations	Instruction			
	3.5	Has suitable language for the user	Instruction			
	3.6	Is simple to explain to others	Method			
	3.7	Generates a result that is simple to explain to others	Method			
	3.8	Has clear terminology	Instruction			
4. Informative content	4.1	Supports users during use	Instruction			
	4.2	Supports users during implementation	Instruction			
	4.3	Has concrete examples	Instruction			
	4.4	Has a clear purpose	Instruction			
	4.5	Explains how to interpret the result	Instruction			
	4.6	Informs where in the process the method should be used	Instruction			

	4.7	Informs which result the user can expect	Instruction			
	4.8	Gives feedback	Instruction			
	4.9	Gives a time estimation	Instruction			
5. Inspiring	5.1	Encourage a changed mindset	Method			
	5.2	Are convincing and involve people	Method			
	5.3	Has a realistic approach	Instruction			
	5.4	Inspires the creativity process	Method			
	5.5	Inspires to new thinking	Method			
	5.6	Allows free thinking	Method			
	5.7	Contain real life stories	Instruction			
	5.8	Touches a new and exciting topic	Method			
	5.9	Is unique	Method			
	5.10	Refers to a well-known person/company	Instruction			
6. Visualisation	6.1	Has coherent visualisation	Instruction			
	6.2	Has visual appealing/interesting figures and text	Instruction			
	6.3	Has a playful and interactive content	Instruction			
	6.4	Generates a clear visual result	Instruction			
7. Publishing	7.1	Has a package that is easy to use	Instruction			
	7.2	Is published in the right context	Instruction			
	7.3	Has a clear name	Method			
	7.4	Is presented in various ways	Method			
	7.5	Accessible publication	Instruction			
	7.6	Credible impression	Instruction			
	7.7	Is easy to refer to	Instruction			
	7.8	Is easy to disseminate	Instruction			

PUBLISHING TEMPLATE

When publishing a design method, it is important to include the seven areas that are visualised in figure 22. The first area is a clear name since it is important that the method has a name that is recognisable and easy to spread to others. The second area is an interesting headline that attracts users and explain what the users can gain when using this method. The third area is the introduction consisting of a short description of the background, such as aim of the method and how the method contributes to creating meaningful and sustainable design. The introduction shall also have a short description of which result the user can expect when using the method and how the work process look like. In the fourth area, prerequisites for performing the method shall be listed, such as team constellation, expected work time, expected time for preparation, target group, tools needed, level of competences needed and in which design process phase the method shall be used. The fifth area is always a stepwise instruction of the work process. The user studies show that users prefer a stepwise instruction and therefore will the project suggest that the researchers include that in their methods. The instruction shall be clear and concise. The sixth area is result and decisions. Here is it important that the researcher explain how to interpret and visualise the result and the decisions that the method had generated. User studies show that this is a crucial factor when disseminating methods to other users. The seventh and last area is contact information to the researcher and reference information.
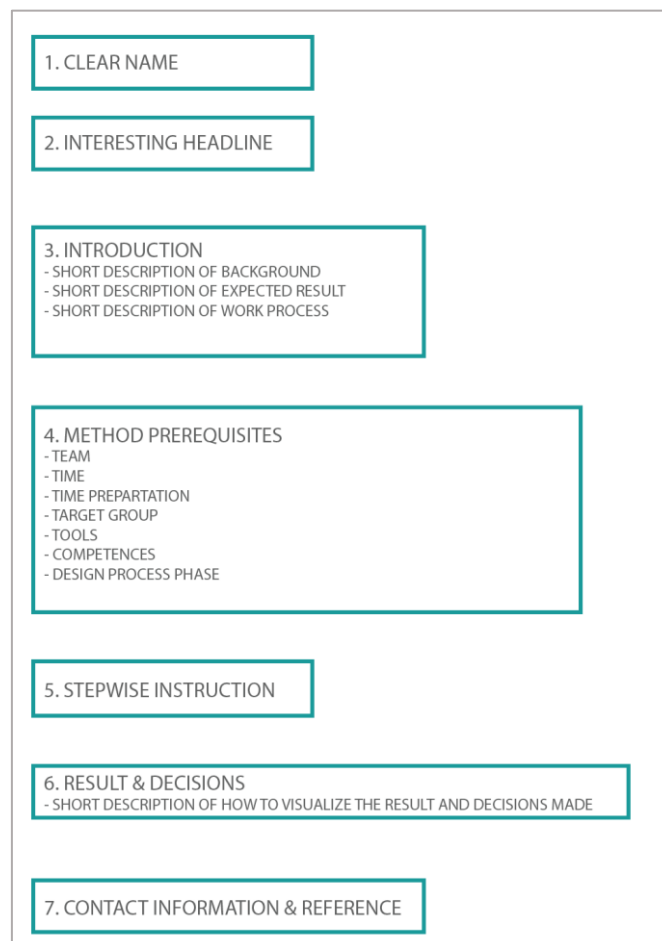
Figure 22. Publishing template for a design method.

5. DISCUSSION

The aim of this project was to investigate which DHF developed design methods that should be available for the industry, and how they should be presented. With the suggested concept and the publishing guide the project answer to these two research questions. In the discussion chapter the methods used to answer these questions as well as the project result will be discussed within following headlines; *Useful design methods, Comparative importance of criteria, Bridging the design space* and *Improvements and further work*.

USEFUL DESIGN METHODS

The aim of the user studies was to identify criteria for a useful design method. The outcome from these studies showed that different users had individual definitions of a useful design method. Users background and previous experience seemed to play an important role. Üretena, et. al (2017) states that factors as the designer's personality, attitudes, well-being, motivation, perception and emotions affect how the user experiencing a design method. Also, experiences and educational background is crucial (ibid).

The outcome of the user studies and compilation of method criteria showed that within some of the areas, user's opinions were more united than within other areas. Areas like *Informative content, Inspiring* and *Visualisation* contains criteria that are primary depending on the user's personality, experience and work situation. The opinions about these criteria seem to vary between users. For example, opinions about criteria regarding the methods ability to give feedback, allow free thinking or being playful and interactive seem to be dependent on the user's personality. The user studies show that some persons are by nature more structured and wanted strict instructions in comparison to others who wanted methods with vague instructions and a lot of freedom. Another difference that probably relates to personal prerequisites is if the user is of more practical nature and prefers physical methods to interact with or if the users are more theoretical and wanted online alternatives instead. It can be argued that these criteria may not be as important as the rest of the criteria in the evaluating form since they vary a lot between users. These areas consist of criteria that probably is depending on company culture and method mindset. How companies are used to work in their design process is often related to a rooted culture and that may affect employee's perception of a useful design method. Professional interviews showed a huge variation of how companies bring in new methods, and if the employees have the freedom to start to use new methods on their own initiative. The user study showed that educational background seems to affect the user's method mindset. One participant in the professional interview mentioned that she has had major use for her method mindset that she got from working a lot with design methods during her education.

Criteria related to areas like *Effective use, Customised use, Understanding and Publishing* seem in general more vital for a useful design method. Those areas consist of criteria that are more general and users' opinions about them was more united. Since all users that have some experience of using design methods assume them to be effective, able to be customised, understandable and easy to access. If any of those criteria are lacking the method would probably be less used.

The publishing template consists of the most necessary factors for publishing research, which all users were united about. These factors; clear name, interesting headline, short introduction, prerequisites for using the method, stepwise instruction, a short description of how to visualise the result and decisions and contact information and references, can be argued to be the most important factors when a designer attempts to identify a useful design method.

COMPARATIVE IMPORTANCE OF CRITERIA

Design methods were evaluated according to the evaluating form consisting of equally valued criteria. If they had been weighted, the result of the method evaluation may have been different. It would had been interesting to ask users what criteria they perceived as most important since some criteria contradicts to each other. For example, it would had been interesting to ask if it is more important that the method delivers a useful result than have a low complexity? Or, if is it more important that the user understands the instruction than that the information is short and compressed. Other criteria that was contradicting was clear process compered to customised work process, or playful content compered to realistic approach.

During the interviews with professionals', differences regarding their opinions about these criteria was noticed. It seemed like professionals' work situation and company played an important role when it came to their perception of a method. A service designer working with involving their users when performing design methods was more prone to like methods that have lower complexity, short description, clear work process and playful content. A product developer working in the car and motor industry, for example, seem to appreciate a method that has a useful result, has an understandable description, can be customised to work process and has a realistic approach. At the interviews, product developers mentioned that their company work process is usually long and that the outcome is more important than performing the method fast. They also found it more important that the method and result were trustworthy than that the method is easy and fun. It can be argued that company structures, cultures and process may affect employee's perception of a usable design method.

Within certain industries, it is important to trace the result of a method to prof the trustworthiness of the outcome. One professional designer mentioned the importance of making iterations of a method and get the same result. The method shall inform about prerequisites for achieving the same result, according to the professional designer. In other industries the method process and the ability to teach others the process is crucial. It can be argued that different kinds of industries have different demands regarding a design method. Some industries may value that a method *generates a clear visual result,* other industries may want a method with a *playful and interactive content*. Therefore, may some of the criteria for a usable design method be more important than others depending on the industry where it shall be used.

It was a huge challenge for the project to come up with a solution that met these contradictory requirements regarding a usable design method. Especially the criteria that is related to personal opinions. In the requirement list, these requirements were weighted lower than other requirements. The criteria dependent on personal prerequisites, experience and work situation is argued in the previous section to be less important than the others and could, therefore, have been weighted lower than the others in the evaluating form.

BRIDGING THE DESIGN SPACE

As mentioned earlier, the company culture affects an employee's perception of a useful design method. To create a new design space with its own culture as Sanders (2017) advocates was crucial when developing the suggested concept. The final concept is a suggestion for how to connect research and practise through a community which do not belong to any of these parties. According to both Sanders (2017) and Helmer (2015) is a new community a solution for bridging the gap between these parties.

Sanders (2017) points to a problem with incompatibilities between how design research is used in practice and how design research is used within academia. The suggested platform will hopefully increase the transparency of how these parties work with design research. The material researchers offer gets visible and which methods that industry actually use gets obvious. In that way the platform will encourage a culture of openness and fulfil the design space. The innovation advisor mentioned the

importance that academia and industry agrees on their impact of the society. With this platform these parties have the possibility to meet and agree on their purpose of using methods. The platform is assumed to be a design space were users can collaborate, share information and inspire each other.

This online platform is a suggestion and a first step when it comes to compiling and publishing DHF design methods into one channel. Hopefully will this solution also be a step further to finding that niche that the division searched for. The solution will encourage the division to work together and using a strategy for publishing research, since the material in the platform must be coherent. The design area is huge, therefore the platform solution may not be enough for disseminating design methods. Other solutions will probably be needed to complement the platform when bridging the gap between academia and practice. The suggested concept needs to be tested and evaluated by users and researchers.

The vision with the platform is to offer design methods that encourage industry users to think of meaningful and sustainable design questions in an early stage of their design process. By making the methods easy to reach and share and fun to use, users will hopefully try new methods instead of sticking to the well-known ones. The platform helps the user to highlight sustainable and meaningful decisions that have been made which were mentioned as an important factor in the user studies. By visually present these decisions to management, companies' overall attitude to achieve meaningful and sustainable design may increase.

Hopefully, designers working with these methods will see advantages like their work gets more fun and varying since they can access new methods. Their work may also feel more meaningful and up to date. If design methods become more available for the industry, all project members in a team can feel more involved in the design process, since they all have access to the method instructions. Project members with other competences than designers can access this platform and that may increase the collaboration in the project teams.

By controlling the menu of which design methods that is available, the platform also controls the choices designers have. It can be discussed if it is right to guide designers in a given direction by only providing a selection of methods. The proposed concept does not intend to limit the designers in their creative work and this problem needs to be considered when implementing the platform.

IMPROVEMENTS AND FURTHER WORK

In the study, all the design methods were evaluated according to the same procedure. The published material was read through and the evaluated form was filled in. Unfortunately, there was no time for testing the methods and that may have impacted the outcome of the evaluation. The evaluation of design methods was done by one person if it had been an average of several person opinions the result may have been different. The original plan was to evaluate the design methods at several focus group sessions. Since available participants were limited, that plan was changed. The evaluator's earlier experience of the evaluated design methods may also have impacted the result. Some methods were well known for the evaluator and some were completely new. The evaluator's personal opinions about how a design method should be may also play a crucial role in the evaluation of the method, something that could have been prevented if there had been several evaluators.

Infographic is a common format that is easy for a user to assimilate. The visualisation of an infographic is interesting, modern and it is easy to adjust to Chalmers University of Technology visual brand. Since the topic design is related to appealing visualisations, it is beneficial that the infographic format allows that. The final concept did not meet all requirements in the requirement list. The requirements that infographics as a format do not fulfil are supported during use, generating a visual result and ability to adapt the method according to specific needs. An infographic is in general quite static and not that interactive. Users cannot change the content and the format does not generate a varied outcome. To

improve this, interactive and animated infographics may be a suitable alternative. Then users can interact and get more support during use. Unfortunately, this solution will not suite the printed version of an infographic which is a beneficial alternative when working in teams.

The largest challenge in this project has been to find a packing solution that suits all design methods. Since the result from the user studies showed that users, in general, want methods that are based on process models rather than concept framework, the project decided to focus on a package solution for these types of design methods. Professional designers and students are interested in research that helps them to bring their work forward and generates a concrete result. To create new thoughts with a concept framework seems not to be enough for these users. Therefore, are concept frameworks suggested to be more suitable for academic purpose.

How to update the material on the platform need to be considered by the division. One benefit of letting the researcher create the material by their own is that they are most familiar with the research and it gets quick and right from the beginning. If an external person creates the material the quality may decrease but the material may become more coherent. Due to time and resources, this decision needs to be made by the division. If the platform provides a template that researchers can fill in, the time for adding new material may not require more than approximately one work day for a researcher.

As Helmer (2015) states, it is first when research is published it can be validated by others. It is time for researchers to see the value of publishing method research in a proper context to achieve feedback. It will hopefully be strengthening the quality of their work and give them inspiration for future research projects. The suggested publishing guide will help researchers to reach these users in a context where the user has the possibility to give feedback. As always when it comes to selling something the need for creating interest and curiosity is important. User studies showed that researchers in general have problems with marketing their own findings. This guide would help them in how to reason. As the innovation advisor mention, researchers may benefit from learning how to publish their research during their postgraduate education. The next step for researchers at Chalmers University of Technology is to uses a common strategy for publishing to make their material become more trustworthy for the industry.

6. CONCLUSION

To answer the research question regarding which DHF design methods that should be available for the industry, the project suggests that design methods that have a process model form are easier to adapt for the industry than concept frameworks. Process models have a concrete work process, is supportive and has a temporal sequence that industry users and students require. To distinguish methods with process model from would be the first step of separating design methods that should be available for the industry. Then the methods need to be evaluated according to the criteria in the publishing guide. Design methods that are built on a concept framework are suggested to be re-designed or used for the academical purpose only. A method that has a process model form is easy to publish in a channel like the proposed *Design and Human Factors Method Graphic Platform.* Such a method generates a visual result that can be shared with others.

The developed publishing guide shows all parts that are suggested to include when publishing design methods. These parts are a clear name, interesting headline, a short introduction, prerequisites for using the method, stepwise instruction, short description of how to visualise the result and decisions and contact information and references. The publishing guide encourages researchers to think of their publication of research in detail from the start of their project.

The suggested concept called *Design and Human Factors Method Graphic Platform* will hopefully be a suitable design space were users can collaborate, share information and inspire each other. The platform will provide users with design methods which are easy visualised in an infographic. The community will encourage a change mindset and a willingness to create a good design that is meaningful and sustainable. This online platform is a suggestion and a first step when it comes to compiling and publishing DHF design methods into one channel. Both the online platform and the publishing guide need to be further tested by users.

These project conclusions will help the division of DHF in their future work of making their research more available for the users. In the longer term, the division has the potential to become a division which is in the forefront when it comes to bridging academia and practice together for creating good designs.

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APPENDIX

APPENDIX A- INTERVIEW QUESTIONS

RESEARCH INTERVIEW QUESTIONS

- Which methods, tools and frameworks have you develop in our research so far?

- Do you experience that these methods are used? In which situation and by which users in that case?

- If not, why do you think they are not used? What is the problem or the barrier? Which improvements can be made?

- What do you feel is crucial for the dissemination of research and for making the methods used?

- Is there any colleague of ours that have succeeded to make their research more available? Is there any method developed by a colleague that you want to highlight?

- Do you see any difference between how a research is publish? Doctoral thesis, Journal article, Book, Report, Conference contribution?

- Do you think all research at the division should be available for the industry? Why? Why not?

- Have you tried to make the research more available in any way? Do you have an idea of what could make your research more available?

- Do you have an idea of how research methods, tools and frameworks should be packaged and presented for the industry?

- What do you think is the pros and cons with making the research available at online platforms, mobile applications and books? What will you prefer?

- Do you think other divisions at Chalmers succeeds better with spreading their research? Why? Do you think the research area impacts?

DESIGN STUDENTS AND DESIGN PROFESIONALS QUESTIONS

General

What is your general attitude towards design methods?

When are you using design methods? In which situations?

What is crucial for a design method to reach you?

Do you search for design methods and research? If yes, where are you searching?

Do you experience that methods are easy to find? Why? Why not?

Adaptability

What characterizes a usable design method?

What characterizes an unusable design method?

What is crucial for you to use a method twice?

Efficiency

What determines if a design method is efficient to use?

Simplicity

What determines if a design method is easy to understand?

Informative

What determines if a design method gives enough information?

Inspiring

What determines if a design method is inspiring?

What determines if you are going to use the design method in your future work and spread it to others?

Publishing

How do you want the design methods to be published? Books, online platforms, mobile applications or other? Why?

What is a good context for publishing design methods?
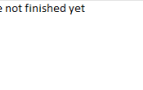
FOUCUS GROUP DISCUSSION QUESTIONS
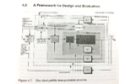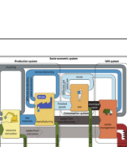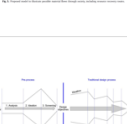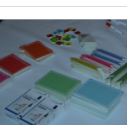
1. What is your overall impression of the method?

2. Do you think the method is able to **adapt** to user needs and situations? Why, why not?

3. Do you think this method is **efficient** to use? Why, why not?

4. Do you think this method is **simple** to use? Why, why not?

5. Is the instruction/**information** about the method sufficient? Why, why not?

6. Is the method **inspiring**? Why, why not?

7. How do you perceive the **presentation** and **packaging** of the method? What can be improved?

8. Which method presentation do you prefer?
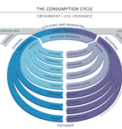
APPENDIX B- EVALUATING FORM

Name of the method:						
The evaluated method...	1-Disagree Completely	2- Partly important	3- Important	4- Very important	5- Agree completely
Adaptability ...Is able to adapt to user needs and situation					
Is able to personalize					
Is possibility to integrate into PDP					
Is possible to adapt to a specific challenge/problem					
Is able to adapt to available resources					
Is able to adapt to team constellation					
Efficiency ...Requires limited time					
Requires limited resources					
Simplicity ...Is easy to learn and understand					
Is easy to start using					
Has a simple work process					
Has simple descriptions and illustrations					
Has suitable language for the industry					
Has suitable language for the education					
Informative ...Gives suited training					
Supports during use					
Supports during implementation					
Gives practical examples in user areas					
Has a clear purpose					
Has a clear result					
Gives fast information about usefulness					
Use proper language (not too academical)					
Are explained pedagogical					
Inspiring ...Encourage a changed mindset					
Are convincing and involve people					
Gives a positive and clear first impression					
Has a realistic approach					
Inspires the creativity process					
Inspires to new thinking					
Touches a new and exciting topic					
Packaging ...Has a format that is easy to use					
Is published in the right context					
Has a clear name					
Is presented in various ways					
Contains compressed information					
Is informative					
Highlights only important information					
Consists of material that is easy visualized					

APPENDIX C- LIST OF DHF DESIGN METHODS

METHOD NAME	AUTHOR	YEAR	PAPER	PROCESS MODEL/ CONCEPT FRAMEWORK	TOPIC	AIM	PROCESS	IMAGE	AVERAGE SCORE
Tentative Framework	Cecilia Berlin	2011	Ergonomics Infrastructure - An Organizational Roadmap to Improved Production Ergonomics	Process model	Day-to-day ergonomics practice and organizational-relational influences on ergonomics work	Mapping the "ergonomics infrastructure" in an organization	The data collection is organized using the workflow demonstrated in Figure 2 and the stepwise instructions that follow.		2,43
Four specific success-related social sustainability dimensions	Cecilia Berlin	2018	Why social sustainability counts: The impact of corporate social sustainability culture on financial success	Concept framework	Social aspect of sustainability and its influence on successful business	The four dimensions work as predictors that differentiate between successful and non-successful companies	Sustainability strategy and leadership; Mission, communication and learning; Social care and work life; and Loyalty and identification.		-
ACD³	Cecilia Berlin & Lars-Ola Bligård	2018	ACD³ as a framework for design of ergonomic workplaces	Concept framework	Collaborative workplace design	Structure process and clarify the design decisions that are pertinent to ergonomics			2,7
CMSM (Capability Methodology for Sustainable Manufacturing)	Cecilia Berlin	2018	A Methodology to Align Core Manufacturing Capabilities with Sustainable Manufacturing Strategies	Process model	Core business and manufacturing capabilities enable strategies for sustainable manufacturing	Allows top management to foster the desired sustainable manufacturing strategy within the company	Ten-step methodology		1,96
CyFL Matrix	Cecilia Berlin	2018	A framework for operative and social sustainability functionalities in Human-Centric Cyber-Physical Production Systems (CPPS)		Technological developments of Cyber-Physical Systems	A guideline to analyze how the functionalities of a CPPS relate to operational and social sustainability-related performance impacts at different levels of	Six main functionalities enabled by a CPPS and three levels of analysis	Are not finished yet	-
Design procedure for fixtures	Cecilia Berlin	2017	A novel comparative design procedure for reconfigurable assembly fixtures	Process model	Fixture design	Comparative procedure for design and verification of reconfigurable fixtures.	It introduces four stages, two of which comprise several design steps. The order of the steps follows a logic chain of necessary design decisions.		2,04
Change Agent Infrastructure (CHAI)	Cecilia Berlin	2016	Change Agent Infrastructure (CHAI) – a Stakeholder Analysis Tool for Ergonomics- and Work Environment- Related Change Projects	Process model	Ergonomics/work environment-related change projects	It maps potential stakeholders against eight distinct "roles" that have been found in previous research to facilitate or hinder workplace change.	The method is meant as a participative team exercise for early stages of change projects		3,36
CCPE (combined evaluation of cognitive and physical ergonomics)	Lars-Ola Bligård & Anna-Lisa Osvalder	2014 2012	CCPE: Methodology for a Combined Evaluation of Cognitive and Physical Ergonomics in the Interaction between Human and Machine Predicting mismatches in user–artefact interaction. Development of an analytical methodology to support design work (Doctoral tehsis)	Process model	Human–machine interaction	Perform a joint systematic search for poten-tial ergonomic deficiencies in the human–machine in-teraction, such as high workload (physical and mental), use errors, usability problems, and physical ergonomic errors.	CCPE methodology consists of four phases: 1) definition of evaluation, 2) human–machine system descrip-tion, 3) workload analysis, and 4) interaction analysis.		2,73
Framework to aid analysis and design of human –vehicle interaction	Lars-Ola Bligård	2018	HMI of Autonomous Vehicles - More Than Meets the Eye	Concept framework	Autonomous vehicle interaction	To aid analysis and design of human – vehicle interaction	The framework is based on four types of interactive surfaces. The first is the explicitly designed interfaces of today, the second is the interior design of the vehicle as a whole, the third is the implicit information included in the vehicle's movement pattern, and the fourth is the interactive technology brought into the vehicle.		2,21
PU2B	Lars-Ola Bligård	2015	PU2B-modellen - En introduktion till Model Based Systems Engineering (MBSE) utifrån användarcentrerad systemdesign	Concept framework	Systems engineering	Grundtanken med PU²B-modellen är att bygga upp en systemmodell med hjälp av enkla typer av objekt som adderas och successivt kombineras till en mer heltäckande modell.	För att kunna hantera frågeställningar med rätt objekttyp i sitt mest lämpade sammanhang har det därför skapats tre abstraktionsnivåer för ett system: Systemdefinition, Produktdefinition, Arkitekrutdefinition.		2,14
PUEA (Predictive use error analysis)	Lars-Ola Bligård & Anna-Lisa Osvalder	2013	Predictive use error analysis - Development of AEA, SHERPA and PHEA to better predict, identify and present use errors	Concept framework	Human systems and errors	A proactive analytical method for use error analysis in the design process	Three parts: preparation, analysis, and compilation in matrixes. The actual analysis comprises two parts: detection of potential use errors and their investigation.		2,45
ECW (Enhanced Cognitive Walkthrough)	Lars-Ola Bligård & Anna-Lisa Osvalder	2013	Enhanced Cognitive Walkthrough: Development of the Cognitive Walkthrough Method to Better Predict, Identify, and Present Usability Problems	Concept framework	Ergonomics and interfaces	Analyticalmethod for analysis of potential usability problems	ECW uses a detailed procedure to simulate the user's problem-solving process in each step of the interaction between user and interface. ECW comprises three parts: preparation, analysis, and presentation of the results in matrices.		2,66

METHOD NAME	AUTHOR	YEAR	PAPER	PROCESS MODEL/ CONCEPT FRAMEWORK	TOPIC	AIM	PROCESS	IMAGE	AVERAGE SCORE
System model	Lars-Ola Bligård & Anna-Lisa Osvalder	2009	Framework to describe and categorise a complex human-machine system	Concept framework	Systems engineering	Evaluation of similarities and dissimilarities between different human-machine settings	The framework consists of four parts: The basic system, The control system, The operator, The organisation.		2,61
Predictive Ergonomic Error Analysis (PEEA)	Lars-Ola Bligård & Anna-Lisa Osvalder	2006	Predictive Ergonomic Error Analysis – A Method to Detect Incorrect Ergonomic Actions	Process model	Systems engineering	Considers possible ergonomic errors that can be performed by the user when handling a product in a context	------>		3,02
Analytical framework for public (mass passenger) transportation	Stig Franzén	1999	Public Transportation in a Systems Perspective A Conceptual Model and an Analytical Framework for Design and Evaluation	Concept framework	Public transportation	Evaluation of total systems preformace can be conducted to capture the most cruical system components for successful systems	Abstraction levels will be used for the description of the total public transpotation systen		2,09
Framework for user-artefact relations	Marianne Karlsson	1996	User Requirements Elicitation - A Framework for the Study of the Relation between User and Artefact	Concept framework	Relation between the user and the technical artefact	A tool for thought and discussion in the process of designing and evaluating user requirement studies	The framework suggests that five dimensions need to be explored and analysed on different levels		2,84
The triangulation model	Marianne Karlsson	1998	Triangulation strategies in user requirements investigations: a case study on the development of an IT-mediated service	Concept framework	Identify user problems or user requirements	Managing the multidimensionality of user requirements investigations			2,52
PRE-process	Marianne Karlsson	1996	Att skapa ett företagsspecifikt arbetssätt för att hantera kundkrav	Concept framework	Kundkravhantering	Praktisk handledning för alla företag som vill förbättrs sin förmåga att hantera kundkrav i samband med produktutvecklingen.	Tre områden/komponenter: - En process för att hantera kundkrav - Bemanning av projekt - Metoder för att hantera kundkrav		3,52
Design model for preventing waste	Isabel Ordonez Pizarro	2016	Designing out waste - Exploring barriers for material recirculation	Concept framework	Sustainability and waste handling	To provide an overview of strategies designers can use to contribute to resource conservation	The model assist in the choice of startegy, and the lifecycle stages helps identify which actors should be involve		2,23
Circularity assessment framework	Isabel Ordonez Pizarro	2017	Circularity assessment in companies: conceptual elements for developing assessment tools	Concept framework	Circularity assessment	Framework aims at providing a common basis regarding the definition of circularity, its criteria and assessment approaches at the company level	Four building blocks: a purpose for circularity assessment; the relevant scales at which it should be implemented; the criteria that allow to define if a company is circular or not; and finally, what principles need to support the assessment.		2,93
Model for material flows through society	Isabel Ordonez Pizarro	2015	Resource recovery from post-consumer waste: important lessons for the upcoming circular economy	Concept framework	Circular economy	Model is intended to highlight recirculation possibilities for materials through society	Routes are classified based on the stage of the product life cycle into which they recover material: use phase (reuse), manufacturing stage (re-manufacture) or material production (recycling).		-
Pre-process model for designing with waste	Isabel Ordonez Pizarro	2012	FROM INDUSTRIAL WASTE TO PRODUCT DESIGN	Concept framework	Waste handling	Activities that need to take place before the traditional design process can set in, constituting an extra dimension or phase to the generic design process	"pre-process" has its starting point in the waste material itself. This material has to be analyzed, after which ideas for what it could be used in should be generated. The pre-process consist of three phases; Analysis, Ideation and Screening		2,73
GTS (Generic Task Specification)	Anna-Lisa Osvalder &Lars-Ola Bligård	2008	Generic Task Specification – A Framework for Describing Task Demands and Mental/Physical Work loads in a Human-Machine System	Concept framework	Human-machine interaction	Mapping task demands and human mental/physical work loads in the interaction	The aspects are divided into four parts: (1) task demands, (2) automation levels, (3) mental workload, and (4) physical workload.		2,8
Remanufacturing assessment	Oskar Rexfelt	2017	A tool for assessing customers' barriers for consuming remanufactured products	Process model	Remanufactured products	Aiming to support remanufacturing organisations to get a better understanding about the customers and their possible ways of reasoning when they approach an offer based on a remanufactured product	The team will initially encounter a number of statements (link) representing barriers for consuming remanufactured products, and are prompted to rank how relevant they are. When the team has finished this questionnaire, a summary will indicate a number of areas with potential for improvement.	https://www.onlineassessmenttool.com/remanufacturing-assessment-addressing-the-customer-in-acquiring-and-using-remanufactured-products/assessment-36641	3,71
Modelling kit	Oskar Rexfelt	2009	METHODOLOGY FOR SERVICE INNOVATION IN A MULTI-DISCIPLINARY CONTEXT	Concept framework	Service development	Gradually mock up service concepts through an evolutionary process, while continually reflecting on potential effects at overall level. Team is expected to actively consider interactions between different constituents of a service system	The kit is designed as a parlour game, and includes different cards to support the visualisation, consisting of following components: Actors, Stakeholders, Effects, Actions, Information, Objects, Support technology		2,77

METHOD NAME	AUTHOR	YEAR	PAPER	PROCESS MODEL/ CONCEPT FRAMEWORK	TOPIC	AIM	PROCESS	IMAGE	AVERAGE SCORE
Adapted morphological matrix	Oskar Rexfelt	2009	METHODOLOGY FOR SERVICE INNOVATION IN A MULTI-DISCIPLINARY CONTEXT	Process model	Service development	Step-by-step method for development of their selected two service ideas	Two main steps; first a "top-down" decomposition and listing of possible sub-solutions, and then a "bottom-up" synthesis.		2,64
Activity scheme	Oskar Rexfelt	2008	FROM CONSUMPTION TO USE - CONSUMER REQUIREMENTS IN FUNCTIONAL SALES	Concept framework	Service development	The proposed model focuses on how a new innovation changes activities, which may in their turn alter need fulfilment.			2,52
Leaflet	Oskar Rexfelt	2009	METHODOLOGY FOR SERVICE INNOVATION IN A MULTI-DISCIPLINARY CONTEXT	Concept framework	Service development	Formulation of a manuscript for a promotion leaflet for each service proposal.			2,43
Use2Use	Anneli Selvefors	2018	Re-framing Product Circularity from a User Perspective	Concept framework	Sustainable consumption	It highlights new design strategies for enabling and facilitating product circularity, as well as points to a number of aspects that need to be further explored in order to develop products and service offers that are relevant and desirable from a user perspective.	consumption process into The three main phases Obtainment, Use, and Riddance		3,0
Layers of design	Anneli Selvefors Helena Stömberg	2016	What a designer can change: a proposal for a categorisation of artefact-related aspects. Design Beyond Interventions – Supporting Less Energy-reliant Activities in the Everyday	Concept framework	Design for Sustainable Behaviour perspective	Proposes a categorisation of artefact-related aspects that in different ways set people's preconditions for acting with technology.	The categorisation sorts these aspects into different layers: from the over--arching layer of enabled activity, through artefact type(s), operativefunctions, interactive functions, and finally communicative		2,93
Map of pathways of sustainable behaviour	Anneli Selvefors	2015	Mapping out the design opportunities: pathways of sustainable behaviour	Concept framework	Design for Sustainable Behaviour perspective	Aim of charting different paths that users can follow to reduce environmental impact when interacting with artefacts	The five proposed pathways of sustainable behaviour are: (1) choice of artefact, (2) changed use, (3) maintenance and repair, (4) mediated use and (5) regulated artefact		3,14
Trust-based framework	Jana Sochor	2018	Creating Appropriate Trust in Automated Vehicle Systems: A Framework for HMI Design	Concept framework	Trust in Automated Vehicle Systems	A guiding framework for implementing trust-related factors into the HMI interface	The process is divided into three usage phases: preuse, learning, and performance. The scenario aims to construct a holistic understanding of a typical interaction with an AD vehicle		2,82
Topology of MaaS	Jana Sochor	2017	A topological approach to Mobility as a Service: A proposed tool for understanding requirements and effects, and for aiding the integration of societal goals	Concept framework	Mobility as a Service (MaaS)	Comparison of different services, understanding MaaS' potential effects, and aiding the integration of societal goals into MaaS services	Topology consists of MaaS Levels 0 to 4 as characterized by different types of integration: 0 no integration; 1 integration of information; 2 integration of booking and payment; 3 integration of the service offer, including contracts and responsibilities; 4 integration of societal goals.		2,46
CARE approach	Ingrid Pettersson	2018	Eliciting User Experience Information in Early Design Phases	Process model	UX design	Enabling richer and more in-depth UX data in early design phases	The approach contains the steps of Contextualise, Act and interact, Reflect and Express (CARE)		3,52
Strömberg Karlsson Acceptance Scale	Helena Strömberg Marianne Karlsson	-	-	Process model	Product design	The aim of the method is to test the user's acceptance of a product in order to gain a deeper understanding of the user's willingness and satisfaction with using, and buying, the product.	This is accomplished by means of a questionnaire containing 20 items selected based on acceptance theory. The items comprise the four areas trust and control, perceived benefit, perceived effort, and compliance.		3,39

USER PROFILE- DESIGN STUDENT

Name:	Sam
Age:	25
Type of user:	Primary User
Occupation:	MSc Student
Education:	MSc Indrustrial Design Engineering
Experience:	5 years of studies within design
Frequency of use:	Will use the platform to search for new methods, find inspiration and get guidance how to perform a method

PERSONA- DESIGN STUDENT

Sam is doing his fifth year of mater studies in Industrial Design Engineering at Chalmers University. During his education he has learned a lot of design methods that teachers has presented in diffrent courses. Some of the methods do Sam remember better than others and they are the ones he uses in his current master thesis at Volvo Cars. Sam thinks that design methods in general are useful because they stimulates thoughts but he do not want them to be too time consuming and too strict.

Sam´s biggest intrest is graphical design and he likes to sketch nice pictures. In the future he wants to work as an interaction designer and do graphical designs. It is time for Sam to do generate ideas for his mater thesis and Sam wants to find a new method that suites his needs in the project. Unfortunately, Sam do not know were to search for new inspiring methods. He do not know what key words to use and in which platform. Sam uses design forums and YouTube daily and had liked if the methods would be available there.

Usually, it ends with Sam uses a method that he had tested at a lecture in school. He chose a method that have gave him a successful result the first time he used it. It is also important for him that the method is visual attractive and that the instruction and method is coherent. Sam only chose a method that is fun and quick to use.

At Volvo, colleuges ask Sam if he knows any inspiring methods that they could use. Sam tend to mention the ones that are simple to explain and has a physical presentation that he can distribute. He also likes digital publications that he do not need to buy, then he can send the link to a colleuge that ask him for advice.

USER PROFILE- PROFESSIONAL DESIGNER

Name: Mia
Age: 40
Type of user: Primary User
Occupation: R&D Manager Husqvarna
Education: MSc Product Development
Experience: 10 years of work experince
Frequency of use: Will use the platform to search for new methods, find
                   inspiration and get guidance how to perform a method

PERSONA- PROFESSIONAL DESIGNER

Mia works as a R&D manager at Husqvarna and have been at that position for four years now. Before that she worked as a design engineer. Mia likes her job and founds new intresting project inspiring. She leads a group of eight emploeeys working with development of Dust and slurry products. Mia found design methods useful when the project group shall develope a completly new product. Unfortently, she experience design methods to generate a lot of paper work and they are in general hard to adapt to the specific project. She would like the methods to be more scalable accorning to time and resources that are availbe in the project.

At the moment Mia leads a group working with a new Dust product and she what to increase her team members inspiretion by using a new design method. Normally, she gets directive from the managment team or a selected team that works with finding new research, but in this case she whant to find something useful by her own. She start searching on Google Scholar but found it hard to free access to methods online. She gets a bit annoyed and calls a contact which she knows working with these kind of reserach.

Mia founds a design method that seems suitable for her project and suggest it for her project members. She gets various response from her team members who has various personalities. Some of them likes to try new things and others want to work as they allways do. Mia found it difficult to convince her team members about the method since it do not have a clear work process and the format is not that visual inspiring. Her colleagues ask her if there is any examples how to use the method but unfortunately there is no one.

Mia tells the managment team about the new method she have found and she gets a lot of questions. They askes her which result they can expect from the method but that is not Mia able to answer. She want to contact the person how have developed this design method but do not know how to get in touch.

USER PROFILE- DHF RESEARCHER

Name:	Jessica
Age:	37
Type of user:	Secondary User
Profession:	Researcher at the division of Design & Human Factors
Reserach area:	Sustainable consumption & circular economy
Experience:	5 years of PHD studies and 4 years as a researcher
Frequency of use:	will use the platform to upload new research and evaluate the use of exisiting research

PERSONA- DHF RESEARCHER

Jessica works as a researcher at the division of Design & Human Factors. During her five years of PHD studies and four years as a researcher she have been part in eight projects togheter with diffrent stakeholders from the industry. The theme of the project have been traffic behaviour and sustainable consumption. Jessica thinks that the research at the division need to be more available for the industry. It is only then the division has the possibility to influence the industry to create meaningful and sustainable design.

Jessica experiencing that it is easy to find new project but it is hard to know if customers in the industry uses the results. Since new projects is started quickly and collaborations with companies ends there is hard to judge if professional designers are using the method she has developed. Jessica finds it easier to influence the design students by offering opportunities to try the methods in the education. Through them she can disseminating the research and methods to the industry.

Jessica thinks that the way of packaging, presenting and communicating research at the division need to be improved. The division need to become more visible and have a strategy for marketing their research. Today she do not prioritise to communicate her existing research, since she focus on finding new projects and write new papers because it is the number of papers that counts. She belives that researchers need to consider packaging in thier bugdget of the project and prioritise to disseminate previous research. Today Jessica do not devote any time for publishing research even if she knows that it would be necessary to reach users. Jessica do not know how to publish her findings and she would like the division to offering a common platform for all research created at the division. Today the division work in various areas and she cannot imagine how such a platform would look like.

To be able to reach the users Jessica thinks she needs to adapt her research towards them. Unfortunately, Jessica do not know how she should adapt the presentation of it. Jessica belives that she would be more pride of here research if she know that designers are using it.

APPENDIX E- EVALUATION OF DESIGN METHODS

The current method...	Tentative framework	Social sustainability dimensions	ACD3	CMSM	CyFL Matrix	Design procedure for fixtures	CHAI	CDPE	Framework- vehicle interaction	PU2B	PUEA	ECW	System model	PEEA	Framework- public transportation	Framework- User-artefact relations	The triangulation model	PRE-process	Design model- preventing waste	Circularity assessment framework	Model- material flows through society	Pre-process model- designing with waste	GTS	Remanufacturing assessment	Modelling kit	Adapted morphological matrix	Activity scheme	leaflet	Use2Use	Layers of design	Pathways of sustainable behaviour	Trust-based framework	Topology of MaaS	CARE approach	Acceptance Scale
Adaptability																																			
Is able to adapt to user needs and situation	5,00		5,00	3,00		5,00	4,00	4,00	4,00	4,00	3,00	4,00	4,00	4,00	3,00	4,00	4,00	5,00	3,00	4,00		4,00	5,00	4,00	4,00	4,00	4,00	3,00	4,00	4,00	3,00	4,00	3,00	5,00	5,00
Is able to personalize	5,00		5,00	2,00		4,00	4,00	4,00	4,00	3,00	3,00	3,00	3,00	4,00	2,00	4,00	4,00	4,00	4,00	2,00		4,00	3,00	4,00	4,00	4,00	3,00	2,00	3,00	3,00	3,00	4,00	3,00	5,00	5,00
Is possibility to integrate into work process	4,00		5,00	2,00		4,00	5,00	4,00	4,00	3,00	4,00	4,00	4,00	4,00	3,00	4,00	4,00	4,00	4,00	4,00		5,00	4,00	4,00	5,00	3,00	4,00	4,00	4,00	5,00	4,00	4,00	5,00	5,00	5,00
Is possible to adapt to a specific challenge/problem	3,00		5,00	3,00		4,00	4,00	4,00	3,00	3,00	4,00	4,00	4,00	4,00	3,00	4,00	5,00	3,00	2,00	3,00		3,00	2,00	2,00	3,00	3,00	2,00	2,00	3,00	3,00	2,00	3,00	4,00	4,00	4,00
Is scalable according to prerequisites (time, resources)	2,00		3,00	3,00		3,00	4,00	4,00	5,00	3,00	4,00	2,00	4,00	3,00	2,00	4,00	3,00	3,00	3,00	3,00		4,00	3,00	4,00	4,00	4,00	3,00	3,00	4,00	4,00	3,00	3,00	4,00	3,00	3,00
Efficiency																																			
Is time effective	2,00		2,00	2,00		2,00	3,00	3,00	3,00	1,00	2,00	1,00	4,00	3,00	2,00	3,00	3,00	2,00	2,00	2,00		3,00	2,00	4,00	3,00	3,00	3,00	2,00	3,00	3,00	3,00	2,00	3,00	3,00	2,00
Is resources effective	3,00		2,00	2,00		2,00	2,00	3,00	3,00	1,00	2,00	1,00	4,00	3,00	2,00	3,00	3,00	2,00	2,00	2,00		3,00	2,00	2,00	3,00	3,00	2,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00
Is cost effective	3,00		2,00	2,00		2,00	4,00	3,00	3,00	1,00	3,00	2,00	3,00	3,00	3,00	2,00	2,00	2,00	2,00	2,00		3,00	2,00	2,00	3,00	3,00	4,00	4,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00
Requires limited competences	1,00		1,00	1,00		1,00	3,00	2,00	2,00	1,00	2,00	3,00	3,00	1,00	2,00	2,00	2,00	2,00	1,00	1,00		3,00	1,00	4,00	3,00	2,00	2,00	1,00	4,00	3,00	3,00	3,00	2,00	5,00	5,00
Requires limited preparations	2,00		1,00	1,00		2,00	2,00	1,00	4,00	1,00	2,00	1,00	4,00	4,00	3,00	4,00	3,00	3,00	3,00	4,00		2,00	2,00	5,00	2,00	2,00	3,00	1,00	4,00	3,00	4,00	3,00	3,00	3,00	2,00
Requires limited afterwork	2,00		1,00	1,00		2,00	2,00	2,00	4,00	1,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	1,00	2,00	3,00		2,00	3,00	2,00	2,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	2,00
Makes users secure during use	4,00		4,00	3,00		4,00	4,00	2,00	1,00	3,00	3,00	3,00	1,00	4,00	1,00	2,00	1,00	4,00	1,00	3,00		3,00	4,00	5,00	1,00	2,00	1,00	1,00	3,00	3,00	4,00	2,00	1,00	3,00	4,00
Facilitates decision making	4,00		4,00	3,00		4,00	3,00	3,00	3,00	4,00	2,00	4,00	3,00	4,00	4,00	3,00	2,00	4,00	3,00	4,00		4,00	4,00	5,00	3,00	4,00	4,00	4,00	4,00	5,00	4,00	4,00	3,00	5,00	5,00
Decreases project risks	4,00		4,00	3,00		4,00	3,00	4,00	2,00	4,00	5,00	5,00	2,00	4,00	3,00	3,00	2,00	4,00	2,00	2,00		2,00	4,00	2,00	2,00	2,00	2,00	3,00	2,00	2,00	4,00	3,00	2,00	2,00	2,00
Decrease project complexity	3,00		2,00	2,00		2,00	2,00	2,00	1,00	1,00	4,00	2,00	2,00	2,00	2,00	3,00	1,00	2,00	2,00	2,00		2,00	1,00	3,00	3,00	2,00	2,00	2,00	3,00	2,00	3,00	3,00	3,00	2,00	2,00
Contains compressed information	2,00		4,00	1,00		1,00	5,00	3,00	4,00	1,00	1,00	2,00	2,00	4,00	1,00	2,00	2,00	2,00	3,00	2,00		3,00	3,00	5,00	4,00	3,00	3,00	3,00	1,00	3,00	2,00	3,00	5,00	4,00
Highlights important information	1,00		3,00	1,00		1,00	5,00	2,00	1,00	1,00	1,00	2,00	1,00	2,00	1,00	1,00	1,00	1,00	1,00	2,00		3,00	2,00	4,00	3,00	2,00	2,00	3,00	1,00	1,00	2,00	2,00	2,00	5,00	4,00
Simplicity																																			
Is easy to learn and understand	3,00		1,00	1,00		1,00	4,00	3,00	3,00	1,00	1,00	2,00	2,00	4,00	2,00	3,00	2,00	4,00	3,00	2,00		4,00	3,00	4,00	3,00	2,00	2,00	3,00	4,00	3,00	3,00	2,00	4,00	4,00
Is easy to start using	2,00		1,00	1,00		3,00	3,00	2,00	3,00	1,00	1,00	1,00	4,00	3,00	3,00	4,00	3,00	3,00	2,00	3,00		4,00	2,00	5,00	4,00	3,00	2,00	2,00	3,00	4,00	4,00	3,00	2,00	4,00	4,00
Has a clear work process	5,00		1,00	4,00		1,00	5,00	2,00	1,00	1,00	1,00	2,00	2,00	5,00	1,00	1,00	1,00	2,00	2,00	3,00		4,00	3,00	4,00	4,00	2,00	1,00	1,00	4,00	4,00	4,00	3,00	1,00	4,00	4,00
Has simple descriptions and illustrations	3,00		2,00	1,00		1,00	4,00	1,00	1,00	1,00	2,00	4,00	4,00	3,00	3,00	4,00	3,00	3,00	4,00	4,00		3,00	2,00	3,00	2,00	3,00	2,00	2,00	5,00	4,00	4,00	3,00	3,00	4,00	3,00
Has suitable language for the user	2,00		4,00	2,00		2,00	4,00	4,00	2,00	4,00	4,00	4,00	4,00	4,00	2,00	4,00	4,00	4,00	3,00	3,00		5,00	5,00	5,00	5,00	4,00	4,00	4,00	4,00	4,00	3,00	5,00	5,00	5,00
Is simple to explain to others	1,00		1,00	1,00		1,00	4,00	2,00	3,00	1,00	1,00	2,00	3,00	2,00	4,00	1,00	3,00	1,00	3,00	2,00		3,00	2,00	3,00	3,00	3,00	4,00	3,00	3,00	3,00	3,00	2,00	3,00	4,00	4,00
Generates a result that is simple to explain to others	1,00		1,00	1,00		1,00	2,00	3,00	3,00	1,00	1,00	2,00	4,00	3,00	2,00	4,00	1,00	3,00	1,00	4,00		2,00	1,00	4,00	1,00	2,00	2,00	2,00	4,00	4,00	4,00	4,00	4,00	4,00	5,00
Has clear terminology	4,00		4,00	4,00		3,00	4,00	4,00	3,00	4,00	4,00	4,00	4,00	4,00	3,00	4,00	3,00	4,00	3,00	4,00		4,00	4,00	4,00	4,00	3,00	3,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00	5,00
Informative																																			
Supports users during use	4,00		4,00	3,00		1,00	4,00	1,00	1,00	3,00	1,00	4,00	1,00	4,00	1,00	1,00	1,00	5,00	1,00	4,00		3,00	4,00	5,00	3,00	1,00	1,00	2,00	2,00	3,00	3,00	2,00	1,00	4,00	4,00
Supports users during implementation	2,00		4,00	3,00		1,00	1,00	1,00	1,00	2,00	1,00	2,00	1,00	1,00	1,00	2,00	1,00	2,00	1,00	3,00		2,00	2,00	4,00	2,00	1,00	1,00	2,00	2,00	2,00	2,00	1,00	1,00	3,00	2,00
Has concrete examples	1,00		1,00	1,00		1,00	5,00	5,00	1,00	5,00	5,00	5,00	5,00	5,00	4,00	4,00	5,00	5,00	1,00	1,00		5,00	1,00	5,00	1,00	4,00	4,00	1,00	4,00	1,00	4,00	1,00	1,00	4,00	1,00
Has a clear purpose	4,00		3,00	2,00		2,00	4,00	4,00	2,00	5,00	4,00	4,00	3,00	4,00	3,00	2,00	5,00	2,00	4,00		3,00	5,00	5,00	4,00	3,00	3,00	4,00	4,00	4,00	4,00	3,00	2,00	5,00
Explains how to interpret the result	1,00		2,00	1,00		1,00	1,00	2,00	1,00	2,00	1,00	2,00	1,00	1,00	1,00	1,00	3,00	2,00	3,00	1,00		2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	4,00
Informs where in the process the method should be used	1,00		5,00	2,00		4,00	4,00	5,00	1,00	5,00	1,00	3,00	1,00	2,00	2,00	3,00	2,00	3,00	1,00	2,00		5,00	2,00	2,00	2,00	2,00	2,00	3,00	2,00	5,00	4,00	2,00	5,00	5,00
Informs which result the user can expect	1,00		2,00	2,00		1,00	2,00	2,00	2,00	1,00	1,00	2,00	1,00	2,00	2,00	2,00	3,00	2,00	1,00	4,00		2,00	2,00	3,00	2,00	2,00	3,00	3,00	2,00	3,00	2,00	2,00	2,00	2,00
Gives feedback	1,00		3,00	1,00		1,00	1,00	1,00	1,00	2,00	2,00	3,00	2,00	2,00	2,00	1,00	1,00	1,00	4,00	2,00		2,00	2,00	5,00	2,00	2,00	2,00	2,00	3,00	3,00	2,00	3,00	2,00	3,00	3,00
Gives a time estimation	1,00		1,00	1,00		1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00		1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	5,00
Inspiring																																			
Encourage a changed mindset	3,00		3,00	2,00		1,00	4,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	4,00	3,00	4,00	2,00	4,00		4,00	4,00	4,00	4,00	3,00	4,00	4,00	3,00	3,00	3,00	2,00	3,00	5,00	4,00
Are convincing and involve people	2,00		3,00	3,00		3,00	4,00	3,00	1,00	4,00	3,00	4,00	3,00	3,00	3,00	4,00	2,00	4,00	4,00	4,00		2,00	4,00	5,00	5,00	4,00	3,00	4,00	3,00	3,00	3,00	3,00	3,00	3,00	4,00
Has a realistic approach	4,00		4,00	3,00		4,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00	3,00	4,00	4,00	4,00	4,00	4,00	4,00		4,00	4,00	5,00	4,00	3,00	2,00	5,00	4,00	4,00	4,00	4,00	2,00	4,00	5,00
Inspires the creativity process	1,00		1,00	1,00		1,00	3,00	1,00	1,00	1,00	1,00	1,00	2,00	1,00	1,00	2,00	2,00	2,00	2,00		2,00	2,00	3,00	4,00	4,00	3,00	3,00	3,00	3,00	2,00	4,00	2,00
Inspires to new thinking	2,00		2,00	1,00		3,00	4,00	3,00	2,00	3,00	2,00	4,00	3,00	2,00	3,00	5,00	3,00	4,00	4,00		3,00	2,00	4,00	4,00	5,00	3,00	3,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00
Allows free thinking	4,00		3,00	3,00		3,00	5,00	4,00	4,00	3,00	3,00	4,00	4,00	4,00	3,00	4,00	3,00	3,00	4,00		4,00	4,00	4,00	4,00	3,00	5,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00
Contain real life stories	1,00		1,00	1,00		1,00	5,00	5,00	1,00	1,00	5,00	5,00	5,00	4,00	4,00	5,00	5,00	1,00	1,00	4,00		1,00	5,00	1,00	3,00	3,00	1,00	1,00	4,00	4,00	3,00
Touches a new and exciting topic	2,00		2,00	2,00		2,00	2,00	1,00	2,00	1,00	2,00	2,00	1,00	1,00	2,00	4,00	3,00	3,00	5,00		3,00	2,00	3,00	3,00	4,00	3,00	3,00	3,00	4,00	4,00	4,00	4,00	3,00
Is unique	2,00		2,00	2,00		1,00	2,00	1,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	4,00	4,00	3,00	3,00		3,00	2,00	3,00	3,00	4,00	4,00	3,00	1,00	3,00	2,00	3,00	2,00	1,00	1,00
Refers to a well-known person/company	1,00		1,00	1,00		1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	4,00	1,00	1,00	1,00		1,00	1,00	5,00	1,00	1,00	3,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Visualisation																																			
Coherent visualisation of method and description	2,00		2,00	1,00		1,00	3,00	1,00	2,00	1,00	2,00	1,00	2,00	2,00	2,00	1,00	2,00	2,00	3,00		2,00	2,00	3,00	2,00	2,00	2,00	2,00	5,00	2,00	3,00	3,00	3,00	4,00	4,00
Visual appealing/interesting figures and text	1,00		1,00	1,00		1,00	2,00	1,00	1,00	1,00	1,00	1,00	1,00	2,00	2,00	1,00	2,00	2,00	4,00	3,00		2,00	1,00	2,00	2,00	2,00	2,00	4,00	2,00	2,00	2,00	3,00	2,00
Playful and interactive content	1,00		1,00	1,00		1,00	3,00	3,00	1,00	1,00	1,00	1,00	1,00	1,00	2,00	2,00	3,00	2,00	3,00		1,00	3,00	4,00	5,00	4,00	2,00	2,00	2,00	2,00	4,00	2,00	2,00
Has a clear visual result	1,00		1,00	1,00		1,00	2,00	1,00	1,00	2,00	4,00	2,00	2,00	2,00	2,00	3,00	2,00	1,00	4,00		2,00	2,00	4,00	2,00	2,00	2,00	2,00	2,00	4,00	2,00	2,00
Publishing																																			
Has a package that is easy to use	2,00		2,00	1,00		1,00	3,00	2,00	1,00	2,00	2,00	4,00	2,00	4,00	2,00	4,00	3,00	2,00	4,00		2,00	4,00	6,00	2,00	2,00	1,00	2,00	2,00	3,00	3,00	4,00
Is published in the right context	2,00		2,00	2,00		1,00	4,00	3,00	1,00	1,00	2,00	2,00	3,00	1,00	2,00	3,00	1,00	2,00	3,00		2,00	3,00	5,00	4,00	2,00	1,00	2,00	2,00	2,00	2,00	3,00	4,00
Has a clear name	1,00		5,00	4,00		1,00	5,00	5,00	1,00	5,00	5,00	5,00	1,00	5,00	1,00	3,00	3,00	5,00	1,00	2,00		2,00	5,00	2,00	1,00	3,00	5,00	4,00	3,00	1,00	1,00	5,00	3,00
Is presented in various ways	1,00		1,00	1,00		1,00	2,00	1,00	1,00	2,00	2,00	2,00	4,00	2,00	1,00	4,00	2,00	3,00	1,00		1,00	2,00	3,00	1,00	4,00	2,00	2,00	2,00	3,00	4,00	4,00
Accessible publication	3,00		4,00	2,00		3,00	4,00	4,00	4,00	4,00	4,00	3,00	3,00	3,00	1,00	2,00	3,00	5,00	1,00	2,00		3,00	3,00	5,00	2,00	2,00	3,00	2,00	3,00	3,00	3,00	3,00	4,00
Credible impression	5,00		4,00	4,00		3,00	4,00	4,00	3,00	4,00	3,00	4,00	3,00	3,00	3,00	4,00	4,00	3,00	3,00		3,00	4,00	4,00	4,00	4,00	4,00	4,00	3,00	5,00	4,00
Is easy to refer to	5,00		5,00	5,00		5,00	4,00	4,00	4,00	4,00	4,00	3,00	4,00	3,00	2,00	4,00	4,00	5,00	2,00	2,00		2,00	3,00	5,00	2,00	2,00	3,00	3,00	4,00	3,00	3,00	3,00	3,00	5,00
Is easy to disseminate	3,00		4,00	3,00		2,00	4,00	3,00	3,00	1,00	2,00	2,00	2,00	1,00	2,00	2,00	2,00	3,00	5,00	1,00		2,00	3,00	5,00	1,00	1,00	3,00	3,00	3,00	3,00	3,00	3,00	4,00
AVERAGE SCORE	2,43	-	2,70	1,96	-	2,04	3,36	2,73	2,21	2,14	2,45	2,66	2,61	3,02	2,09	2,84	2,52	3,52	2,23	2,93	-	2,73	2,80	3,71	2,77	2,64	2,52	2,43	3,00	2,93	3,14	2,82	2,46	3,52	3,39

APPENDIX F- REQURIMENT LIST

No.	Requirement		Sub-requirement	Description	Priority [1-5]	Type (guideline, requirement)	Requirement delivered from
Dissemination							
	Dissemination of research	a.	Sharing	Allow sharing of research between users	5	R	Researcher interviews
		b.	Access	Simple access	5	R	User study 2
		c.	Selling	Enable selling of the	4	R	Researcher interviews
		d.	Marketing	Enable marketing of the method	3	G	Researcher interviews
		e.	References	Access to reference information	2	G	User study 1, Interview with communication Chalmers
	Allow maintenance of content	a.	Update information	Easy to update information	4	R	Researcher interviews
		b.	Adding information	Easy to add information	4	R	Researcher interviews
	Appealing impression	a.	Unique format	Method has an unique format and content	3	G	Researcher interviews
		b.	Trustworthy format	Method has a trustworthy format and content	5	G	User study 1 & 2
		c.	Modern format	Method has a modern format and content	3	G	User study 1 & 2
	Allow personal contact			Allows personal contact between users with	3	G	Pre-study, User study 2
	Implementation			Allows implementation in other forums	2	G	Researcher interviews
Functions							
	Facilitate searching			Easy to search for methods within the platform	4	G	User study 1 & 2
	Support and training			Give suited training	4	G	User study 1 & 2
	Highlighted information	a.	New information	Highlighting new information	2	G	User study 1
		b.	Important information	Highlighting important information	3	G	User study 1
Adaptability							
	Adaptable	a.	Work process	Adaptable according to work process	4	G	User study 2
		b.	Problem	Adaptable according to problem	4	G	User study 1/2
		c.	Resource conditions	Adaptable according to resource conditions	4	G	User study 1/2
		d.	Type of method	Format is adaptable according to method type	5	R	Researcher interviews
Information							
	Naming			Method name is clear	4	G	User study 1/2
	Result			Informs about expected result	5	G	User study 1/2
	Informs about context	a.	Suitable target group	Informs about which type of product/service and	3	G	User study 1/2
		b.	Integration in the design process	Informs about integration in the design process	4	G	User study 1/2
	Informs about complexity	a.	Prior knowledge and competence	Informs about prior knowledge and	3	G	Pre-study
		b.	Resources estimation	Informs about resources estimation	4	G	Pre-study
		c.	Time estimation	Informs about time estimation	4	G	Pre-study
		d.	Estimated time for preparations	Informs about estimated time for preparations	3	G	User study 1/2
		e.	Tools needed	Informs about tools needed	3	G	User study 1/2
	Providing feedback	a.	Finished	Give finished feedback	4	G	User study 1
		b.	Result	Give feedback regarding result	5	G	User study 1/2
		c.	Support during use	Give support during use	4	G	User study 1/2

		d.	Support during implementation	Give support during implementation	4	G	User study 1/2
		e.	Researcher feedback	Allow users to give feedback to researchers	2	G	Researcher interviews
Intuitive							
	Intuitive work process	a.	Where to start	Where to start is clear	4	G	User study 1
		b.	Where to finish	Where to finish is clear	4	G	User study 1
		c.	The amount of work steps	The amount of work steps clear	3	G	User study 1
	Intuitive instructions	a.	Pedagogical material	Instructions is pedagogical	4	G	User study 1
		b.	Use proper language	Instructions uses a proper language	4	G	User study 1
		c.	Clear illustrations and symbols	Instructions uses clear illustrations and symbols	4	G	User study 1
		d.	Clear examples	Instructions has clear examples	4	G	User study 1
		e.	Compressed information	Instructions consist of compressed information	3	G	User study 1
	Intuitive result	a.	Generates a visible result	The method generates a visible result	5	G	User study 2
		b.	Generates a result that can be shared	The method generates a result that can be shared	5	G	User study 2
Inspiration							
	Inspiring presentation	a.	Encourage changed mindset	The presentation encourages a changed mindset	3	G	Pre-study
		b.	Interacting and involving people	The presentation makes people interact and get involved	5	G	User study 1, User study 2
		c.	Give a positive and clear first impression	The presentation gives a positive and clear first impression	4	G	Pre-study
		d.	Realistic approach	The presentation has a realistic approach	5	G	User study 1
		e.	Allows creative thinking	The presentation allows creative thinking	3	G	User study 1
		f.	Interesting format	The presentaion has an interesting format	4	G	
		g.	Fun to use	The presentation makes the method fun to use	3	G	User study 1, Interview with communication Chalmers
Interface							
	Visualization of interface	a.	Coherent information	The interface consists of coherent information	5	G	User study 1
		b.	Follows a visual theme	The interface follows a visual theme	3	G	User study 1
		c.	Aesthetically appealing	The interface is aesthetically appealing	3	G	User study 1
		d.	Follows Chalmers visual identity	The interface follows Chalmers visual identity	5	R	Interview with communication Chalmers
		e.	Follows Chalmers communication policy	The interface follows Chalmers communication policy	5	R	Interview with communication Chalmers
Safety							
	Published material is safe	a.	To use	The published material is safe to use	5	R	Researcher interviews
		b.	To publish	The published material is safe to publish	5	R	Researcher interviews
		c.	To disseminating	The published material is	5	R	Researcher interviews

APPENDIX G- PUGH MATRIX

Area	Description	Weighting [1-5]	Type	Method in paper (reference)	Storytelling book	Game application	Online infographics	Visual interesting magazine	Podcast lectures	YouTube instruction videos	Picture board game	Online platform with movies	Mobile application database	Hero board game	Company project book	Online platform with games	YouTube movies with stories	Magazine with well-known companies	Online platform with lectures
Dissemination																			
	Allow sharing of research between users	5	R		-1	-1	1	-1	1	1	-1	1	-1	-1	-1	1	1	0	1
	Simple access	5	R		-1	1	1	-1	1	1	-1	1	1	-1	-1	1	1	0	1
	Enable selling of the method	4	R		1	0	1	1	0	0	1	0	0	1	1	0	0	1	0
	Enable marketing of the method	3	G		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Access to reference information	2	G		0	-1	0	-1	-1	-1	-1	0	-1	-1	0	0	-1	-1	0
	Easy to update information	4	R		0	1	1	0	0	1	0	1	1	0	0	1	1	0	1
	Easy to add information	4	R		0	1	1	0	0	1	0	1	1	0	0	1	1	0	1
	Method has a unique format and content	3	G		0	1	1	1	1	1	1	1	1	1	0	1	1	0	1
	Method has a trustworthy format and content	5	G		1	-1	-1	-1	-1	-1	-1	0	-1	-1	1	0	-1	1	0
	Method has a modern format and content	3	G		0	1	1	1	1	1	1	1	1	1	0	1	1	1	1
	Allows personal contact between users with authors	3	G		0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
	Allows implementation in other forums	2	G		-1	1	1	-1	1	1	-1	1	1	-1	-1	1	1	-1	1
Functions																			
	Easy to search for methods within the platform	4	G		0	0	1	0	-1	0	0	1	1	0	0	0	0	0	1
	Give suited training	4	G		1	-1	0	1	1	1	1	1	-1	1	1	0	0	1	1
	Highlighting new information	2	G		0	0	1	0	-1	0	0	1	1	0	0	1	0	0	1
	Highlighting important information	3	G		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Adaptability																			
	Adaptable according to work process	4	G		0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Adaptable according to problem	4	G		0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Adaptable according to resource conditions	4	G		0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Format is adaptable according to method type	5	R		1	0	1	0	-1	0	0	0	1	0	1	0	0	1	0
Information																			
	Method name is clear	4	G		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Informs about expected result	5	G		1	0	1	1	1	1	1	1	0	1	1	1	1	1	1
	Informs about suitable work environment	2	G		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	Informs about which type of product/service and industry	3	G		1	0	0	1	1	0	0	1	0	0	1	0	1	1	1
	Informs about integration in the design process	4	G		0	0	1	1	1	1	1	1	0	1	0	0	1	1	1
	Informs about prior knowledge and competence	3	G		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	Informs about resources estimation	4	G		0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
	Informs about time estimation	4	G		0	0	1	0	1	0	0	0	0	0	0	1	0	0	0
	Informs about estimated time for preparations	3	G		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0

	Informs about tools needed	3	G		0	0	1	0	1	0	0	0	0	0	0	1	0	0	0
	Give finished feedback	4	G		0	1	0	0	-1	0	1	0	1	1	0	0	0	0	0
	Give feedback regarding result	5	G		0	1	0	0	-1	0	1	0	1	1	0	1	0	0	0
	Give support during use	4	G		1	1	1	1	1	1	1	1	1	1	1	1	0	1	1
	Give support during implementation	4	G		1	1	1	1	1	1	0	1	1	0	1	1	0	0	0
	Allow users to give feedback to researchers	2	G		0	0	1	0	0	0	0	1	0	0	0	1	0	0	1
Intuitive																			
	Where to start is clear	4	G		1	1	1	1	0	1	1	1	1	1	1	1	0	1	1
	Where to finish is clear	4	G		1	1	1	1	0	1	1	1	1	1	1	1	0	1	1
	The amount of work steps clear	3	G		1	1	1	1	0	1	1	1	1	1	1	1	0	1	1
	Instructions is pedagogical	4	G		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Instructions uses a proper language	4	G		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Instructions uses clear illustrations and symbols	4	G		1	1	1	1	-1	1	0	1	1	0	1	1	1	1	1
	Instructions has clear examples	4	G		1	0	0	1	1	0	-1	1	0	-1	1	0	1	1	1
	Instructions consist of compressed information	3	G		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	The method generates a visible result	5	G		0	1	1	0	-1	0	1	0	1	1	0	1	0	0	0
	The method generates a result that can be shared	5	G		0	1	1	0	-1	0	0	0	1	0	0	0	0	0	0
Insperation																			
	The presentation encourages a changed mindset	3	G		1	1	1	0	1	1	0	1	1	1	1	1	1	0	1
	The presentation makes people interact and get	5	G		0	1	0	0	0	0	1	0	1	1	0	1	0	0	0
	The presentation gives a positive and clear first	4	G		1	1	1	1	0	1	0	1	1	0	1	1	1	1	1
	The presentation has a realistic approach	5	G		1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1	-1	-1	1	-1
	The presentation allows creative thinking	3	G		0	0	1	0	0	0	1	0	0	1	0	1	0	0	0
	The presentation has an interesting format	4	G		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	The presentation makes the method fun to use	3	G		0	1	1	0	0	1	1	1	1	1	0	1	1	0	0
Interface																			
	The interface consists of coherent information	5	G		1	1	1	1	0	1	1	1	1	1	1	1	1	1	1
	The interface follows a visual theme	3	G		1	1	1	1	-1	1	1	1	1	1	1	1	1	1	1
	The interface is aesthetically appealing	3	G		1	1	1	1	-1	1	1	1	1	1	1	1	1	1	1
	The interface follows Chalmers visual identity	5	R		1	1	1	1	-1	1	1	1	1	1	1	1	1	1	1
	The interface follows Chalmers communication	5	R		1	1	1	1	0	1	1	1	1	1	1	1	1	1	1
Safety																			
	The published material is safe to use	5	R		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	The published material is safe to publish	5	R		1	-1	1	-1	-1	-1	-1	-1	-1	-1	1	0	-1	1	0
	The published material is safe to disseminating	5	R		1	-1	1	1	-1	0	0	0	-1	0	1	0	0	1	0
Total					110	94	159	80	30	102	77	124	117	80	110	135	86	118	122

APPENDIX H- PLATFORM WIRWFRAME

LEVEL 1

LEVEL 2

LEVEL 3

METHOD A

METHOD B

LEVEL 4