It has been shown that it is getting increasingly more difficult to develop usable products due to short development cycles. The Design for Usability project intents to support user centred product development by the development of a methodology and several tools and techniques. This thesis is one of the results of that project, in which a method selection tool for product development has been developed.

Problem: We use methods when we want to create usable and successful products. These methods often involve users in the process by, for example, interviewing or observing them. However, selecting the wrong method or using a method inappropriately can end up in bad design decisions. With hundreds of methods being available, and even more developing rapidly, selecting the right one can be a very difficult and time consuming job.

Process: The main goal of the graduation project was to develop a selection tool for user centred design methods that would support product development teams in their search for a suitable method. Users were involved in various studies during five iterative phases to discover their needs, create possible solutions and evaluate them.

Solution: The result is a proposal for an interactive web application that includes a procedure to find a method according to four main selection criteria: product type, research goal, resources and additional criteria. In addition, the needed method information and a plan for further development are presented.

www.designforusability.org
dfu.tristanweevers.com

Chaired by Prof. Ir. D.J. van Eijk
Mentored by Dr. Ir. J.I. van Kuijk
and Ir. J.J. Daalhuizen

Delft University of Technology
Faculty of Industrial Design Engineering

Partly financed by:

[Image]
Method Selection Tool for User Centred Product Development
Master Thesis

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Delft University of Technology
Faculty of Industrial Design Engineering
Master Design for Interaction

Design for Usability research project

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Voor opa en oma

Omdat ze me al mijn hele leven inspireren en ondersteunen
Summary

This thesis describes the process and results of a graduation project that was carried out at the Design for Usability project from February 2011 to August 2011. The project was the conclusion of the Masters’ course Design for Interaction (DfI) at the Delft University of Technology, The Netherlands. The project was supervised by Prof. ir. Daan J. van Eijk (chair), Dr. Jasper I. van Kuijk and ir. Jaap J. Daalhuizen (mentors). All members currently hold a position at the Delft University of Technology.

It has been shown that it is getting increasingly more difficult to develop usable products due to short development cycles. The Design for Usability project intents to support user centred product development by the development of a methodology and several tools and techniques. This thesis is one of the results of that project, in which a method selection tool for product development has been developed.

Problem: We use methods when we want to create usable and successful products. These methods often involve users in the process by, for example, interviewing or observing them. However, selecting the wrong method or using a method inappropriately can end up in bad design decisions. With hundreds of methods being available, and even more developing rapidly, selecting the right one can be a very difficult and time consuming job.

Goals: The main goal of the graduation project was to develop a selection tool for user centred design methods that would support product development teams in their search for a suitable method. To achieve this, the following sub-goals were set:

- A selection procedure that supports practitioners to find the appropriate method for their situation;
- An interface of the tool which supports the selection procedure;
- A list of the information types that practitioners need at each stage in the selection procedure including the method overview itself;
- A plan for further development.
**Process:** Users were involved in various studies during five iterative phases to discover their needs, create possible solutions and evaluate them.

1. Study on existing method collections, literature and how companies applied methods in practice;
2. The creation and test of five concepts that explored the possibilities of method selection with e.g. the use of social media, user generated content and serious gaming;
3. The third phase focused solely on the procedure of selecting a method. A sequential list of selection criteria was developed and tested at a conference with a working prototype;
4. The development and test of two interface designs to support the selection procedure;
5. The last phase included detailing of the final selection procedure, interface design, method information and development of recommendations for further development.

**Deliverables:** The result is a proposal for an interactive web application that includes a procedure to find a method according to four main selection criteria: product type, research goal, resources and additional criteria. The resources include the possible timespan, man-hours, expertise, available staff and whether the researcher has access to users. Additional resources include the type of study, participant characteristics and study location. In addition, the needed method information and a plan for further development are presented.
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## Appendices
Appendices are available through a separate document and downloadable from [http://dfu.tristanweevers.com](http://dfu.tristanweevers.com)
1 Introduction

This thesis is the result of a graduation assignment that intended to develop a selection tool for methods to be used in user centred design projects. This chapter discusses the essence and importance of usability and the context in which the project is executed.

1.1 About the importance of usability for company success

The subject of this graduation thesis is usability. But what exactly is usability and why is it so important? Let us start by a definition first: “Usability is the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use” (ISO 1998). Or in common language; if you able to use the product in a proper way, within the timespan you think it should be done and without annoyances.

An ideal product could not be used in a wrong manner, goals can be achieved faster than you think it should take and using the product puts a smile on your face. With bad usability, on the other end of the line, it is not clear how the product should be used, it takes way longer than you might expect and use so annoying that you do not want to use the product any more.

A recent example of the consequences of introducing a ‘user-unfriendly’ product can be found at the Dutch police force in Box 1-1 (van Kuijk 2011). Or look what is happening at product development companies. During the past two decades, usability became more important because of the complexity of products. In the past, product returns and complaints were largely due to technical failures. But even now companies are doing well in managing product quality (den Ouden 2006), the number of product returns are on the rise (Brombacher 2005). Not for quality or reliability issues but largely because of usability issues, where no technical fault could be detected: a whopping 48%! (den Ouden 2006). The overall cost for product returns in the United States alone in 2007 were approximately 13.8 billion Dollars (Steger 2007). If about half of this cost is on behalf of bad usability, than companies in the US leave a 7 billion Dollars profit. That is serious money.
The new nation-wide ICT system of the Dutch police force, implemented in 2009, increases rather than reduces the time police officers have to spend on paperwork. Dutch newspaper De Volkskrant (Vries 2011) reports the following striking issues about the system’s development and use:

- An officer reports that with the new system he now spends 60% of his time on paperwork, whereas with the old system that was 30%. The system is so slow that according to an officer who kept track of it, at the end of the day his time spent waiting (so not being able to actually work with the system) amounted up to 1 hour.
- An officer describes the system as: “instead of working for us, it is working against us.”
- A regional test implementation was stopped because the problems that arose were too big. Nonetheless, one year later the system was implemented nationally;
- A unique selling point of the system is that officers all over the country use the same system, but the system only offers officers access to regional data;
- Police officers were involved in the development of the system, but they were not actual end-users of the system;
- There are user-friendly upgrades available, but these cost extra, which only a few of the regional police organizations can afford (Makes an interesting business model though: “Oh, you want the usable version? Then you have to pay extra”).

According to an interviewed officer none of the tasks in the system is logical:

“If I want to report a shoplifting incident, I can only report ‘suspects’ or ‘witnesses’. There is no option to list someone as, for example, ‘involved’. So if the suspect is a minor and I talked to his mother as well, I cannot enter her in the system. (…) It is not possible to report relations between incidents. If speeding is the start of a row between neighbours, I can’t report that in one form.”

Overall The Netherlands employs about 55,000 police officers (Wikipedia 2011). Let’s make some conservative estimates and assume that only half of them use the system on a daily basis. And that, based on the report of the interviewed officer, the amount of time spent on paperwork with the new system is 45% (instead of 60% as he reported). So, we have:

- 27,500 police officers;
- Spending 15% more time on paperwork;
- Which means the Dutch police force just lost the equivalent of at least 4125 officers out in the street;
- Whereas Dutch politicians are currently debating whether to hire 3000 more officers.

All in all, I’d say the Dutch police force and society did not really get a good deal, especially considering the fact that the knowledge on how to develop usable ICT systems is present in industry as well as in academia.

1.2 About the Design for Usability Project

The reason why it is getting more difficult to create usable products is that development cycles are getting shorter and shorter, which put pressure on product development activities (van Kuijk 2010). There is less time to perform usability tests and the recommendations as the outcome of these tests cannot always be implemented (Minderhoud 2005).

It is for this reason that the Design for Usability (hereafter: DfU) project aims to reduce usability problems (especially with electronic products) by developing and offering companies a coherent product development methodology. This ‘way of working’ is supposed to anticipate to the expectations and needs of users on the one hand, and product influences on use practices on the other. As such, it would support product development teams in obtaining accurate, reliable and complete overviews of the way a product will be used and offer procedures for evaluating a design. The project is a five-year collaboration of the Dutch Delft University of Technology, University of Twente and Technical University Eindhoven (hereafter: 3TU) together with the companies Philips, Océ, Unilever, T-Xchange and Indes (hereafter: Industrial Partners).

At the same time of the publication of this thesis, the project entered its finalization phase, where it will deliver all the results of the PhD’s, researchers and me as a graduation student. More information about the DfU project and its deliverables can be found at appendix 1.1 and at our website: www.designforusability.org

1.3 How this project originated

I started with usability when I was around twelve, solving the common annoyances around us in tangible products. Of course, the redesigns were introducing new problems, but it made me choose the Bachelor Industrial Design Engineering at the Saxion University of Applied Science in Enschede. There, I got the chance to dive into the world of user centred product development.

My graduation project for that Bachelor was in 2007, in which I was developing a geographic information system (GIS) at Dutch Railroad maintainer ProRail; a Google Earth like application that includes all sorts of information about the railroad. It was my first large interface design project at the time. With an Industrial Design education as my background, I wasn’t trained to design and test interfaces, but ‘real’ tangible products. Consequently, I did not know how to test the four concepts that I designed in a proper way. So I asked my former teacher in user centred design. He said that there was a method called ‘paper prototyping’ which would suit my needs. There was a book and a website about this method (www.paperprototyping.com), which gave some guidelines. My teacher had some information about the method as well, but there was no practical hands-on information about how to execute the method and analyse the data; I had to compile that knowledge myself from different sources. It took me some time until I understood what the best path was to use the method in my situation, but I mastered the method and developed a final design.

Not long after the project was finished, I figured that I was lucky that my teacher could share his knowledge and to have been given the time to learn a method and adjust it to my needs. It made sense to me that product developers do not have this luxury, while I was positive that a practitioner could stumble upon similar challenges and search for a method. Not only when he is developing a product...
within a new field that he is less experienced in, like I was, but also because he might use a couple of methods over and over again, tailoring it to his situation, although there might be a better method out there. But you need to know about the existence of the method before you can judge if the method is better than what you are using now. You need time for that, which is, not surprisingly, very scarce. Consequently, I envisioned, practitioners would stay in their comfort zone of what they believe that works fine.

Well, you can imagine that the most comfortable way isn’t always the best. So I started a project in 2008 by which I intended to include all methods in one single source with a selection procedure by which designers could find the perfect method for their situation. How everything could look like was completely unknown to me, but I used my own experience as a starting point. I called the tool Usarto, an acronym for Usability Research Tool, and spoke with a couple authorities in the field of usability about this idea, such as Donald Norman and Nigel Bevan. But since I was going for my Master degree at the Delft University of Technology and because I needed a team and a large budget to establish the tool, it ran ashore.

Until the World Usability Day symposium in Delft at November 11, 2009. I got to know the Design for Usability project, of which the proceedings were presented on that day. I noticed that there was a link between the projects’ goals and the intention I had with Usarto; so I proposed the idea to some team members. Soon I became a student assistant in the project and I started my graduation project there early in 2011.

This thesis, as the result of that graduation project, describes the development of a method selection tool that supports product development teams to create more usable products; exactly what I wanted to achieve almost four years ago.
2 The Project

This graduation project intended to develop a method selection tool for user centred product development. This chapter explains the project by a problem description, goal definition, an overview of the process and an outline of the used terminology.

2.1 Problem Description

We use methods when we want to create usable and successful products. These methods often involve users in the process by, for example, interviewing or observing them. We can be very familiar with a couple of methods that we can easily ‘tweak’ them to our situation. But what if there is a method that could be a better fit with the problem that you are facing? Or what if you are not that much experienced with methods and you do not have a clue which methods you could use?

It is known that selecting the wrong method or using a method inappropriately can end up in bad design decisions (van Kuijk 2010). But with over 200 methods being currently available (Stanton 2005), selecting the right one can be a difficult and time consuming job (Figure 2-1). Especially since methods are widely spread over various collections in different formats like books, scientific literature or on one of the many available on-line collections (see page 13 for an overview). But whoever thought that looking this information up on line would be faster and easier will be disappointed. Most on-line collections only provide a list of methods, sometimes based on alphabet or process phase; you already need to know the (name of the) method before you can find information about it. And when you can find a method you’ll often see that the provided information is not practical enough to apply the method.

To summarize: An overload of methods through many different sources without help in selecting them and with a lack of practical information. The sub-problems are further described below.
2.1.1 Diversity in methods

There is a great diversity of methods available for industry. There are hundreds of methods available to the practitioner, which I believe has been increased tremendously by the emerging possibilities for using technology in the ways users are involved in the user centred design process. It has been shown by e.g. Cardoso (2005) and Goodman-Deane (2008) that many methods have a mixed and limited uptake in design practice. They are still underused and difficult to understand by development teams and organizations (Seffah 2004). Also, some methods are only required in specialised circumstances, while other methods are relatively new, and not yet widely adopted. Bevan (2003) therefore argues that “more guidance is needed on the appropriateness of the methods in different contexts of use”.

2.1.2 Diversity in method collections

In a study by Tidball (Tidball 2010), forty different collections of user centred design related tools were identified. These collections strive to provide awareness, structure, and information in order to facilitate the understanding and application of differences between these methods. Some collections contain other methods than other collections, use a different framework to categorize methods (if any) and explain methods differently. This can “partly be explained by implicit assumptions about the development environment in which user centred design is expected to be applied” (Bevan 2003); each collection writes the information with their own discipline in their mind. Tidball (Tidball 2010) advocates that the difficulty for developing a good overview of usability methods results from “the mixed nature of our field, where social sciences, arts and technology, and their associated value sets and paradigms”. Battle and Degler (2010) argued that many initiatives are “freezing in time” a particular view of the profession and the knowledge that represents the profession; methods are presented as a static description, while the discipline is evolving and delivering new and improved versions of methods rapidly.

2.1.3 Selecting the appropriate method

Sleeswijk Visser et. al. (2005), argues that the type of method that is used to conduct user research influences the type of information that is found; selecting an inappropriate method could lead to bad design decisions (van Kuik 2010). Although there is a wide literature about usability methods with their advantages and disadvantages (e.g. Nielsen 1993; Maguire 2001 and the various method collections discussed at Page 13), little has been published on how to select the most appropriate methods (e.g. Bevan 2009; Ferre 2010). The problem with many approaches to the selection of user centred design methods is that they start with the method, rather than the purpose for which the method is used. (Bevan 2010). It is therefore, that Wixon (2003) argues that “we need to look at whether we are evaluating methods by the appropriate criteria.”
2.1.4 Method information

Each author of a method proposes his/her own version of a method and links them in a particular methodology (Bevan 2010). Most information is given in purely textual or tabular form, without a practical guide or examples on how to execute the method. Because of this, there is a continued misuse of common methods such as focus groups and observational studies (Nielsen 1997; Greenberg 2008); which is potentially worse than using the wrong method.

2.1.5 Mismatch with the way product designers work

In a discipline where “fast development cycles put pressure on product development activities” (van Kuijk 2010) and where usability needs to be applied to increasingly complex applications and connecting networks of humans with systems of technology they use (Harper 2008; van Kuijk 2010) there is a mismatch between theory and practice.

Goodman et al (2006) found that there is uncertainty and a lack of resources about methods’ usefulness and their effect on design. Cardello (2005) states that this is mainly caused by a poor fit between the (perceived) nature of the techniques and the ways in which designers think and work. Goodman (2007) argues that this also has to do with the fact that “designers often think of user methods separately, rather than as parts of other elements of design, such as idea generation or understanding the market.” She therefore argues that it would be helpful when designers could see methods as a natural part of design.

2.2 Goals and research questions

The main goal of the graduation assignment was to develop a selection tool for user centred design methods that would support product development teams in their search for a suitable method. The end-product should be an on-line, interactive application that would offer practical, hands-on information about methods that fits with product development practice. The graduation assignment consisted of the deliverables in Box 2-1. This means that I have not been developing the tool myself and that I did not write about methods, but that I did determine the required functionality, the interaction possibilities, search options and how and when which content is presented within the tool. In order to achieve these goals, research questions in Table 2-1 have been defined.

<table>
<thead>
<tr>
<th>The main deliverables of this project:</th>
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<tbody>
<tr>
<td>- A selection procedure that supports practitioners to find the appropriate method for their specific situation;</td>
</tr>
<tr>
<td>- An interface of the tool which supports the selection procedure;</td>
</tr>
<tr>
<td>- A list of the information types that practitioners need at each stage in the selection procedure including the method overview itself;</td>
</tr>
<tr>
<td>- A plan for further development;</td>
</tr>
<tr>
<td>- Of course, this thesis and a graduation presentation.</td>
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Box 2-1: The main deliverables of this project.
### The Research Questions of this project

<table>
<thead>
<tr>
<th>Question</th>
<th>Description</th>
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<tbody>
<tr>
<td>1. What can we learn from similar initiatives?</td>
<td>Numerous initiatives have gone before me, all with their advantages and disadvantages. Some of them discontinued a long time ago and other are being currently developed. So, what can we learn from them so that we can avoid the same problems and that we do not have to invent the same wheel again?</td>
</tr>
<tr>
<td>2. What are the characteristics of future users of the tool?</td>
<td>Who are potential users of our tool and what are their specific requirements?</td>
</tr>
<tr>
<td>3. What is the ideal procedure for selecting a method for user centred product development?</td>
<td>We want to support product developers in finding the right method for their specific situation. But what are these situations and how do they influence method selection? How can we support them and make them feel confident with the results that our procedure provides?</td>
</tr>
<tr>
<td>4. What information about methods should be given to the user?</td>
<td>After the selection procedure, but also during this process, information about a method is been given to the user. What information needs to be given at which step? How can we communicate the differences between methods to the users and support in correct execution of the methods?</td>
</tr>
<tr>
<td>5. How does an ideal interface of the tool looks like when it would support the selection procedure?</td>
<td>The selection procedure needs a ‘face’; an interface so that it could be used effectively, efficiently and satisfactory. What are the functions that users need and how should they be implemented? How can the interface stimulate users to find new, undiscovered, methods? So, how can the interface ultimately support the selection procedure?</td>
</tr>
<tr>
<td>6. How does further development looks like?</td>
<td>How can further development be established? Which other initiatives and parties could be involved in this process?</td>
</tr>
</tbody>
</table>
2.3 Process

To answer the research questions and achieve the goals mentioned in the previous paragraph, a user centred design process was defined. I involved users throughout the entire developing process and are being referred to in this thesis by their phase and study number (r1.1 is phase 1, study 1), as visualized by the ‘How’ below. Chapter 12 holds a list of the quotes of study 2.1. Other studies were not transcribed as the data was directly translated into results to fuel quick further development. However, the quotes often contain a participant number, so that the original data can be requested by the author.

<table>
<thead>
<tr>
<th>Phase 1: Discover Method Selection</th>
<th>Addressed questions:</th>
<th>How:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 3 (also in Chapters 1 &amp; 2)</td>
<td>1. Existing sources 2. User characteristics 3. Method selection procedure 4. Needed method information</td>
<td>- Open interviews with the industrial partners of the project (r1.1) - Open interviews with the team members of the project (r1.2) - A workshop with PhD Christelle Harkema on January 13 with the industrial partners (r1.3) - Comparing existing tools - Contact with other initiatives - Literature research</td>
</tr>
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<table>
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<tr>
<th>Phase 2a: Creating Concepts</th>
<th>Addressed questions:</th>
<th>How:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 4</td>
<td>1. Existing sources; 2. Method selection procedure; 3. Needed method information.</td>
<td>- Paper prototyping sessions with all industrial partners of the project to test the concepts (r2.1)</td>
</tr>
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</table>

<table>
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<tr>
<th>Phase 2b: Evaluating Concepts</th>
<th>Addressed questions:</th>
<th>How:</th>
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<tr>
<td>Chapter 5</td>
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<table>
<thead>
<tr>
<th>Phase 3a: Creating Selection Procedure</th>
<th>Addressed questions:</th>
<th>How:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 6</td>
<td>1. Existing sources; 2. Method selection procedure; 3. Needed method information; 4. Interface design to support the procedure.</td>
<td>- A workshop at the Chi-Sparks conference to test the selection procedure (r3.1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phase 3b: Evaluating Selection Procedure</th>
<th>Addressed questions:</th>
<th>How:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Phase 4a: Creating Interface Designs

Addressed questions:
3. Method selection procedure;
4. Needed method information;
5. Interface design to support the procedure.

How:
- A workshop at the Chi-Sparks conference to test the selection procedure (r4.1)

Phase 4b: Evaluating Interface Designs

Addressed questions:
3. Method selection procedure;
4. Needed method information;
5. Interface design to support the procedure;
6. Further Development.

How:
- Contact with Design Agency Sparked

Phase 5: Creating Final Design

Addressed questions:
3. Method selection procedure;
4. Needed method information;
5. Interface design to support the procedure;
6. Further Development.

How:
- Contact with Design Agency Sparked

2.4 Terminology
In this document, a set of specific terms are used that may not be known to everybody. These terms are explained below.

2.4.1 Usability and User Experience
You might be familiar with the terms of Usability (explained on page 1) and User Experience (UX). The definition of user experience in ISO FDIS 9241-210 is: “A person's perceptions and responses that result from the use and/or anticipated use of a product, system or service”. The ISO definitions suggests measures of user experience are similar to measures of satisfaction in usability, although there is a difference in emphasis between task performance and pleasure that leads to different concerns during development (Bevan 2009).

The difference between the two worlds is often compared with freeways and mountain roads (Baekdal 2006). Freeways are usable, since they take you from A to B in the most effortless way. But they are also utterly boring. A twisting mountain road on the other hand is exiting, but far from usable. This might seem that by enhancing the usability, one decreases the user experience, but this does not have to be the case. There are a lot of discussions about what is more important in which situation and how one influences another (e.g. Spool 2007; Peacock 2010), but this analogy is the simplest explanation around. Although this is a very interesting topic, both worlds have in common that they tend to serve the user with re is no need to distinguish them for this project since both philosophies intent to achieve user satisfaction.
2.4.2 Methodology

Both usability and UX need a product development process to create the products that match these criteria. The most known methodology is User Centred Design (UCD). “User-centred design (UCD) is an approach to design that grounds the process in information about the people who will use the product. UCD processes focus on users through the planning, design and development of a product” (UPA 2010). The Design for Usability project will deliver its own methodology and/or ‘building blocks’ for practitioners to attach on their own, company-specific, methodology.

2.4.3 Method, techniques and tools

This thesis is about methods and techniques for user centred design. Unfortunately the terms ‘methods’ and ‘techniques’ are often used interchangeably. Roozenburg and Eekels (1995) define a method as a handling process in which structural elements are arranged diachronically. Usability techniques are a description of how to execute specific tasks, more like a recipe (Harkema 2010). As such, a technique serves a specific goal (like a demographic questionnaire), while a method can be interpret differently and dramatically adjusted to fit the practitioners’ goals (like an observational study). This means that techniques can be used as an addition to methods, such as starting an observational study with a demographic questionnaire. Note that methods cannot be part of a technique.

Hoolhorst (2008) states that many techniques are sustained by specific design tools. Often these tools have specially been developed in order to execute the desired technique (such as a video camera). In that perspective, we can distinguish the hierarchy presented in Figure 2-2 (adapted from Hoolhorst, 2008). All of them can be applied at multiple levels of the design process.

There has been discussion about how to handle these differences in this project and in the selection tool. What item belonged to which group and how do we communicate that? However, a distinction does not seem to help the practitioner because he is solely interested in solving a problem. From that perspective, using a technique over a method in pursuing his research goal doesn’t matter and making a deliberate distinction might even be confusing. Therefore, no distinction between methods, techniques and tools has been made in this thesis or the method selection tool. Consequently, by the word ‘method’ I also mean a technique or a tool.
3 Discover method selection

You don’t start a study or design until you know what has already been studied before. The first step in this project explored existing knowledge on method selection, similar initiatives and initial wishes and requirements from practitioners. This chapter explains the findings as a result of that process.

3.1 Research Design

The study was divided into several activities:

1. Open interview with project industrial partners
2. Open interviews with project team members
3. A workshop with PhD Christelle Harkema on January 13, 2011 with the industrial partners
4. Comparing existing tools
5. Contact with other initiatives
6. Literature research

The findings of these studies are presented according to the research question that they address. Not all research questions are being addressed in this chapter because only a few of them could (partly) be answered in this way. The questions being discussed in this chapter are:

1. What can we learn from similar initiatives?
2. What are the characteristics of future users?
3. What is the ideal procedure for selecting a method for user centred product development (according to literature and interviews)?
4. What information about methods should be given to the user?

3.2 What we learned from similar initiatives

In a study by Tidball (2010), forty collections of Human Computer Interaction (HCI) tools were found. This indicates that there is a lot of knowledge available about how a method selection tool could (or should) take place and what the content should be. Therefore, this paragraph outlines what was learned from similar initiatives; collections that hold information about methods for user centred design, supports method selection and contain information about method execution. Table 3-1 shows a selection of the initiatives that matched with these criteria. The references on page 95 show a longer list including links to the sources and appendix 3.1 shows a complete overview of all studied method collections. Box 3-1 zooms in on four on-line collections as they support method selection and/or have detailed method information.

| Table 3-1: A selection of similar initiatives that contain information about UCD methods, support selection (*) and contain information about execution (°). |
|---|---|
| **On-line initiatives** | **Off-line initiatives** |
| 1. Usability Body of Knowledge ° | 7. Namahn UCD process poster * |
| 2. UsabilityPlanner * | 8. Poster selecting remote research tools* |
| 3. UsabilityNET ** | 9. IDEO method cards |
| 4. Usability.gov ** | 10. The Methods Lab booklet |
| 5. Generic Work Process | |
| 6. KAIST framework of methods ** | |
UsabilityBOK (usabilitybok.org)
The Usability Body of Knowledge is “dedicated to creating a living reference that represents the collective knowledge of the usability profession” (Battle, 2010) that was initiated by the Usability Professionals Association in 2004. Next to methods, it also provides information on e.g. organizational topics and related fields. The 40 methods are currently presented on alphabetical order, as the database is still under development. The UBoK continues to grow on voluntary contributions by usability professionals worldwide.

UsabilityPlanner (usabilityplanner.org)
UsabilityPlanner is a recently developed tool that aims to support the selection of UCD methods to be applied in a particular project or organization, and to estimate the relative cost benefits of applying usability methods at different stages” (Ferre 2010). Method Selection is based on wizard-like questions about the goal of your search, project stages, constraints and priorities. The output of the tool shows a prioritized list of suggested methods that could be used at which phase (Bevan 2010). The Usability Planner is still under development and there are intentions to link the planner with the UBoK.

UsabilityNet Methods Table (usabilitynet.org)
The UsabilityNet initiative intended to “provide usability professionals with an authoritative website of resources, including recommended methods for user centred design” (Bevan 2003). The UsabilityNet methods table categorizes methods based on project phases: planning, requirements, design, implementation, testing, and post release. The 35 methods, techniques and other useful steps in the UCD process can be filtered on three criteria: limited time or resources, no direct access to users or limited skills or expertise.

KAIST UCD Methods (dpl.kaist.ac.kr/design-methodology/Main_Page)
The UCD Methods poster of the KAIST categorizes 42 methods on project phases, project constraints, product characteristics, participant information and presentability. The accompanying website gives additional information about the origin of the method, a definition, how-to, example images and pros and cons.

Box 3-1: Four on-line method collections or selection tools that contain high quantity and quality of information.
Many collections focus on web and software development only [4,8] or largely [1,2,3,5]. Tools that focus directly on product development are scarce [7,9]. Four initiatives not only contain methods for user centred design, but contain a wide range of informational topics on usability [1,3,4,5]. A common other topic are methods and tools not directly related to usability (e.g. brainstorm and prototyping techniques), which is included in initiatives 1, 3 - 6, 9 and 10. This raised the question whether we should include other types of information in addition to methods as well. It was decided to include usability methods only to maintain the focus and goals of the project clear. Additional content could always be added later.

Most collections seem to only intend to provide an overview, although some seem to have a scope; e.g. inspiration [7, 10], action [2,6] or education [not listed]. This results in differences in types and the number of methods included: 40 [1], 35 [3], 13 [4] or 88 [5]. In addition, this also results in various ways of methods being explained.

Only a few of the selected initiatives were known by industry (r2.1). Table 3-2 shows that the overall uptake is less than 9%, where the Ideo Methods Cards were used most (by 15% of all participants, 22% of the participants who claimed to know the set). It seems that this card set is an outlier in this selection of collections. The best known digital collections were UsabilityNet and Usability.gov, known by 31% and used by 8% of the participants. Figures that point to an even lower uptake were gathered during study 4.1. The reason for this might be found in the fact that practitioners often use a small set of methods that they tailor to their situation (r4.1 p. 5). As a result, some designers “never ran up against the problem of ‘how am I to study this?’” (r2.1 p. 1.18). However, not feeling the need does not mean that the intended goal of the study could not be achieved quicker, more reliable or with greater detail; there is a lack of awareness.

Tidball (Tidball 2010) studied three collections of usability research methods [3,5,9] on prominent similarities, differences, what is missing, and suggests how these insights can contribute to improving Human Computer Interaction in education and practice. From that study, they concluded the findings represented in Table 3-3. In that same paper, Tidball concluded that “we need to understand and educate ourselves in the different perspectives held by the participants in our domain. (...) We need to effectively communicate ideas in ways that support the perspectives of the numerous disciplines that contribute to HCI. Not one group within HCI should accomplish these efforts alone; this is a collective effort encompassing education, research and practice across all disciplines and domains.”

The largest initiative, the Usability Body of Knowledge (UBoK) “started with grand intentions in 2004, (...) but we have been making slow progress, and recently concluded that the major problem was continuity of management of the efforts of volunteers who write, edit, approve and finally transfer entries from the wiki to the main site” (Bevan 2009a). This indicates that content development by volunteers can significantly delay
overall development. The industrial partners worried about the quality of the information when the content would be developed like a wiki (r1.1).

According to the industrial partners, it is very important that the tool is always up-to-date (r1.1; r2.1). However, many current initiatives were “freezing in time” a particular view of the profession and the knowledge that represents the profession (Battle 2010).

One initiative supports method selection [2], while others serve methods often on alphabetical order or on project phase.

For method information, it can be said that almost every digital collection is text-only [excl. 6], while more visual material is used in the analogue initiatives. This is the case although Faust (1982) argues that humans are not very well equipped to deal with large number of data in a purely textual or tabular form. There are also no downloads, examples and videos available, which were content that were found to be of great value (r1.1).

Table 3-3: Overview of conclusions found by the comparison study of Tidball (2010)

<table>
<thead>
<tr>
<th>Table 3-3: Overview of conclusions found by the comparison study of Tidball (2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
</tr>
<tr>
<td><strong>General</strong></td>
</tr>
<tr>
<td><strong>Categorization</strong></td>
</tr>
<tr>
<td><strong>Information</strong></td>
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<td></td>
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</tbody>
</table>
3.3 The characteristics of potential users

Current initiatives like the Usability Planner and the UBoK have defined several target groups for their development. The Usability Planner distinguishes specific roles within software development based on levels of competency (Bevan 2010). The UBoK also includes policymakers, students and researchers, as they require other types of information (Battle 2010).

Van Kuijk (2010) looked at the various team roles that are interplay in a PDP. He identified six roles in the development of electronic consumer products: product manager, marketing specialist, industrial designer, interaction designer, usability specialist and the development engineer. Each role could have different goals and ways of searching.

User types can also be described based on experience. Inspired by Dreyfus (2003), Eder (2009) created seven levels of expertise: Novice, Advanced Beginner, Competent, Proficient, Expert, Master, Visionary. They correspond with seven ways of perceiving, interpreting, structuring and solving problems. This categorization becomes interesting when we look at the fact that the selection tool should be usable for both novices and experts.

With the information and inspiration gathered from the studies (r1.1; r1.2; r1.3; r2.1) and the literature described above, four user types in the target group were developed as personas. Personas are archetypes of various users within the target group of your future product (Appendix 3.4). In the persona cards (Figure 3-1, 3.2, 3.3 and 3.4), I distinguish both the role and experience of the practitioner in product development processes, while keeping in mind their goals and the context that they work in. This does not mean that I exclude students and researchers, but that I focus, as with the entire DfU project, on product development practice primarily.

The four cards below describe each persona in terms of user characteristics, use goals and environment of work as Hoolhorst (2011) proposes in his stakeholder diagram. In addition, a small explanation of the persona’s intention and scenario of use is being presented. Intermediate results of the project will be tested in an analytical expert review way by myself; “what would Jason do at this point?” and the personas were used to check the final design presented in chapter 10.

![Persona card for the novice user; Martin Lee](image)
### 2. The Creative Expert

**Joyce Bright**

Joyce Bright has over a decade experience in usability testing. With a Masters in Ergonomics, Joyce developed herself over the years in an expert in human factors. She works at a large company that develops high-end professional equipment for construction. For a redesign of an existing drill, she needs to study general product use and more specific the clarity of some safety precautions that the design department developed. Joyce recently read about a method called cultural probes. Although the thinks that the method is not a perfact fit, she wants to experiment with it and combine the method with another one. She will use Dumas to find a good match between the required research goals and her personal wishes. With a short explanation of the goal and working procedure of each method she can tailor the idea of the method to her specific situation.

"I like to experiment and combine methods"

### 3. The Flexible Design Engineer

**Jason Smith**

Jason Smith is involved in a lot of different projects simultaneously. Jason’s has a lot of experience in five methods that are frequently used within the design agency he works for. Every project is different and methods are tailored or combined to fit the project and the product.

Generally, he uses Dumas to use the set of methods more efficiently every time, find new additions to the methods and extend the set with new methods occasionally.

A good client of them, a well-known Dutch bicycle manufacturer, wants to introduce one of their bicycles in the United States. Jason thinks that cultural differences might influence the use of the bicycle and suggested to study what issues might arise. The client was convinced, but remembered Jason on the tight budget that prohibits the agency from going to the United States and test the product face-to-face. Jason needs to be flexible and creative again in selecting a method by which he can gain the right results within the limitations of the client.

"I have a set of methods that I use a lot"

### 4. The Responsible

**Steve Erickson**

Steve Erickson leads product development teams towards success. Steve leads product development projects in such a way that all deadlines are met. In the fast-developing consumer electronic market that he is in, it is difficult to stay ahead of the competition. Decisions have to be made quickly and every step in the process must be as efficient as possible. With a focus on time to market and return on investment (ROI), he is always behind responding to mail and his agenda is always full.

Most of the time he is not personally involved in selecting and executing usability methods and he believes that involving users is not always the most important thing to do because the ‘designers can imagine use’ themselves.

This makes it difficult to convince him of the importance of using usability methods, but Steve says to give room for testing if the potential results will have a significant positive effect on the product being developed.

"We are always low on budget and short on time"
3.4 The ideal method selection procedure

With more than 200 methods being developed according to Stanton (2005), we cannot expect that the practitioner reads all descriptions. The number of methods must be brought down to a set of less than 7 before he considers reading (r2.1; r3.1; r4.1). This process is what we call the selection procedure and this paragraph outlines the first steps towards the development of it.

3.4.1 Important factors in selecting methods

A method which detects 100 per cent of problems with one user would still fail if it did not work within the development process of an organization (Wixon 2003). The industrial partners clarified this aspect by stating that it should be able to align the methods with their process (r1.1). However, each company uses another process (even between projects) – or at least they claim they do (r1.1; r2.1). Without knowing what is exactly being done in each of the three, four, five, six or seven different project phases for all organisations worldwide would make it difficult to visualize, or ‘attach’, methods to a product development process.

However, there are other ways to achieve a perceptual fit with the organization that one is in. For instance by focussing on factors of success as Wixon (2003) suggests; how effective a method usability improvements introduces into the product. This was also mentioned during study 1.1, where industrial partners stated that it is difficult to choose a method when you do not know how much it will improve your design. But indicating a methods’ potential is difficult because the results have a lot to do with the experience and the manner the method is being adjusted to the situation (r2.1).

A less contextual dependent way achieve a fit with product development practice is to find out what the resources for a study are (such as time and budget). Van Kuijk (2010) found that resources are dominant considerations for selecting methods and compiled a list of considerations for choosing a particular method for user involvement from various scientific publications:

- Required time to execute a method, as time pressure in development projects is often high;
- Required financial costs to execute a method;
- Required knowledge and experience to apply a method; whether there is staff with the required knowledge and experience;
- Required equipment/facilities for applying a method;
- Availability of prototypes (in the case of evaluations);
- Whether the results will be available in time to be applied within the current project;
- The information a method produces. Whether the results require much interpretation and are (thus) perceived as ‘objective’ or ‘subjective’ by the audience, and whether the results are actionable and specific;
- How the results of the study can be communicated. Whether the study can be observed by the development team and how convincing the results are, e.g. due to sample size and/or the availability of video images.

The effect on method selection based on resources and other criteria was also shown by ISO TR 16982 (2002, see appendix 3.2) in study 1.3, where the industrial partners claimed to select methods based on resources (e.g. time, budget), goals (e.g. testing a prototype, testing specific handling) and wishes (e.g. direct contact with users, testing among different cultures). The indication that a method would save
money in the end, the chance of finding evidences for in or the potential influence on the total design were also considered to be important factors.

Another factor is the product type that an organization works on because “the type of product a company developed seemed to influence the type of methods for user-centred design that were used, as developing these products evoked the need for a particular type of information, or because the type of product allowed, or did not allow, for a certain type of simulation” (van Kuijk 2010).

Overall pragmatic considerations, such as required resources and ease of execution, seem to outweigh the effectiveness or suitability of methods for user involvement. This explains the reported low adaption of methods that were ranked high on practical importance but costly, such as field studies, versus the high adaption rate of easy and less costly methods such as heuristic evaluation (van Kuijk 2010). This could mean that methods are being used in daily practice that do improve a product to some extent, but that do not have the potential to find the issues that cause the ‘real’ usability problems. For instance; conducting a heuristic evaluation (a list of general guidelines for interface design) gives one a general idea of what needs to be improved on the design, but does not incorporate actual use. And an observational study, by which one observes actual use of the system by giving assignments to the participant, does not include real product use and does not look at long-time use. Every single method has its strengths and weaknesses. This should not be left blindly aside in the decision making process of selecting a method.

3.4.2 How roles and experience influence how one selects a method

The method selection tool will be used by people that have various roles in the product development process; not only usability researchers, but also interaction designers, managers and product developers. Within these roles, people can vary a lot on experience. We must support all roles and levels of expertise; a challenge on its own. This paragraph discusses some of the implications of these aspects.

Eder (2009) argues that the methods-related competency among the team individuals is “probably the least emphasized among the skills and abilities acquired”. This competency includes the “knowledge of and ability to use methods, following the methodological instructions under controlled conditions, and eventually learning them well enough to use them intuitively”. This was also found in study 1.3, where the industrial partners argued that they often struggled with the question whether they should use a usability method to find specific information or that they could use other means as well. There is a degree of uncertainty even before one starts to search for a method.

Designers with more expertise can execute methods from the sub-conscious (Eder 2009); or might even deny using a particular method. Experienced professionals who are familiar with of a range of methods will select the method that they believe will produce the most useful results. Subsequently, they are more likely to customize the method to better match the situation (Monahan 2007). If no method they have used before seems appropriate, they may “experiment and try-out new methods on-the-fly” (r1.1) or create their own method based on existing knowledge, or information obtained from various sources (r1.1 ; r1.2 ; r2.1). Both adjusting and creating methods are not supported by any of the currently available tools.

As included in the personas, novices tend to search methods differently than more experienced practitioners do. They are “still coming to grips
with the basics of a design process and how tools contribute. Their focus is to explore how a method contributes to the development of their design competencies and has very little to do with return on investment” (Tidball 2010).

Before implementation of expertise-relates features is even being considered it needs to be studied what level of experience require other datasets or functions; are we talking about a general level of expertise in user centred design projects, usability studies or even specific experience with competences needed for executing these studies?

There is not enough information available on the differences between how novices and experienced practitioners would search for a method. However, it was decided that we would not to pay special attention to target-group specific functions but to design the general application first.

### 3.4.3 Categorization

A powerful way to create an overview of methods is by categorizing the items (Lidwell 2006). The initiatives use various ways of categorizing the methods, e.g. on project phase [2,3,4,5,6,7], resources (e.g. time, user access, skills) [2,3,6,10], goals [8,9] and research type (inquiry, inspection, testing, related) [not listed]. Although categorization based on project phase is quite popular among the initiatives, we have already seen that this would not satisfy all potential users in the previous paragraph.

Bevan (2010) distinguishes four different ways of categorization for UCD methods (Table 3-4). He compared them and concluded that all these approaches require considerable existing expertise to know in what circumstances it is appropriate to use any UCD method, and what subset of methods might be appropriate in a particular situation.

Goodman (2007) studied the thoughts and reactions of designers on a variety of methods for understanding user needs. The goal of that study was to “identify those techniques that fit well with the ways in which designers think and work”. She let designers categorize methods in a card sorting study. It became apparent that “there is a clear distinction between those that directly involve users and those that enable understanding of the user without

<table>
<thead>
<tr>
<th>1</th>
<th>Usability Body of Knowledge</th>
<th>2</th>
<th>Usability Planner</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>UsabilityNET</td>
<td>4</td>
<td>Usability.gov</td>
</tr>
<tr>
<td>5</td>
<td>Generic Work Process</td>
<td>6</td>
<td>KAIST framework of methods</td>
</tr>
<tr>
<td>8</td>
<td>Poster selecting remote research..</td>
<td>9</td>
<td>IDEO method cards</td>
</tr>
<tr>
<td>7</td>
<td>Namahn UCD process poster</td>
<td>10</td>
<td>The Methods Lab booklet</td>
</tr>
</tbody>
</table>
Methods can be categorized according to the general iterative UCD activities (adapted from Bevan, 2010). There is also a less clear differentiation between those that simply get some information or response from the user and those that involve the user more actively in the process.” However, she concluded, one single categorization would not appeal to all designers. This means that our method selection tool needs to have flexible ways of navigating through and selecting methods.

Battle (2010) categorized methods based on their goals and the disciplines that need to achieve that goal (Figure 3-6). The adapted figure shows that there are different disciplines involved in user centred design projects. It also shows how each discipline is connected to a goal and, subsequently, which methods and techniques which are useful for achieving that goal.

Another categorization was developed by Rohrer (2008), who stated that “knowing when to use each method can be understood by mapping them in 3 dimensions” (Figure 3-7):

- Attitudinal vs. Behavioural: studying "what people say [or] what people do"
- Qualitative vs. Quantitative: “qualitative methods are much better suited for answering question about why or how to fix a problem, whereas quantitative methods do a much better job answering how many and how much type of questions”;
- Context of Product Use: Four different ways of “how and whether participants in the study are using the website or product”.

![Figure 3-5: Methods can be categorized according to the general iterative UCD activities (adapted from Bevan, 2010).](image)

![Figure 3-6: Overview of the relatedness of a goal for method search and the disciplines connected to it. Adapted from Battle (2010).](image)

![Figure 3-7: Several popular methods placed in the grid along three dimensions. Adapted from Rohrer (2008).](image)
3.5 The information about methods

The goal in information giving is not to promote a set of methods that are cheap and less time consuming, but show the value of a method in a specific context of product development. This context that a practitioner is in could be every day. Showing primarily how fast or cheap a method is would be information giving from the methods’ perspective rather than from the users’ perspective. In the end, it is up to the practitioner to decide which method to use, as our tool is only supportive, which could only be achieved by being as objective as possible. The corresponding research question addresses this issue by finding out which content should be provided in which manner to the user of the system.

From the initiatives that were studied in this project, the UBoK content is managed using a database. This means that it would be possible to show particular chunks to the experience and needs of the user (Battle 2010). All methods of the UBoK are explained according to the same framework where distinction is made between the authoritative overview and the potentially collaborative and dynamic detail Figure 3-8.

It has been shown that the desired quantity of information differs for novices and experts; novices want to be ‘taken by hand’ whereas experts only need a good overview to understand the essence and want freedom to tailor the method for their specific situation (van Kuijk 2010). However, research shows that dividing the information in a novice-view and an expert-view would result in both groups to feel that they would miss information (Ziefle 2002). But no matter what the level of experience is, all practitioners “need to have ready-to-use methods, complete with cost estimate and argumentation to sell them (to management).” (Tidball 2010). It was therefore decided 1) to serve all target groups with the same information in a layered format so that they can easily choose to read or skip the information.

From the information presented above, it can also be argued that a flexible ‘context-aware’ framework might work best; where information is tailored to the context of the project the user is working on.

Figure 3-8: Structure for the information page at the Usability Body of Knowledge (adapted from Battle, 2010)
3.6 Conclusions

This study showed that there are a lot of issues with similar initiatives, that the target group is very diverse and showed some first ideas on how a selection procedure could look like. The lists below summarize the key-findings that were discussed in this chapter.

Similar initiatives:

- There are a lot of differences between collections in scope, content and presentation;
- Working with volunteers is difficult as they can drastically slow down development;
- Collaboration possibilities with collections that are currently being developed (i.e. UBoK/UP);

Selection procedure:

- Selecting methods based in resources seems the most natural and logical;
- Categorizing methods in various ways is a powerful way to create understanding en support selection;
- There are differences in how novices and experts search for and apply methods (i.e. step-by-step versus explorative and creative);

Method information:

- There are differences in what information various roles in product development teams look for (i.e. arguments to sell a method to upper management versus information on how to combine various methods and techniques);
- Provide up-to-date content as the discipline is developing;
- Show method information according to a strict consistent framework;
- Show visual content over textual content, as this is hardly being read by practitioners;
4 Creating Concepts

With the information that was presented in the previous chapter in the back of my mind, I developed five very different concepts. Each concept has its own character, functions and interaction, designed to elicit specific responses from participants in the upcoming study. This chapter outlines each concept and explains some of the elements.

Although selecting on resources might seem logical, there are more possibilities to find a method that might be overlooked such as selection based on comments and reviews from other professionals. In addition, it is unknown what a starting point of a search should be like; product type, research goal, existing knowledge or maybe recommendations? In an upcoming test, it should therefore be possible to answer these questions with a broad diversity of possible solutions. The concepts were built to represent various ways of selecting methods and included various function, information types and information depths in order to test what would be of most practical value for practitioners. As such, they explore the horizon of potential solutions and to implement some of the findings that were presented in the previous chapter. In the designs, some assumptions were made regarding the level of experience and the role of the practitioner. These assumptions were made because we decided to find a general design solution first.

Inspiration for the concepts was gained from the results of the previous studies, the success serious gaming productions and a study at Delft University of Technology (Stappers 2000). This chapter outlines each one of the concepts according to their key-components and differences. Appendix 4.1 includes an overview of all concepts and appendix 4.2 to 4.6 show all screens of each concept.
4.1 Concept 1: “Wizard”

The ‘Wizard’ guides a practitioner through a set of questions that are calculated to have the most potential to decrease the amount of methods. The first question is related to the framework of the DfU project by which users can also search for other types of information like how to organize your process best for creating usable products. After each question, method cards (the blocks in the background) disappear and the system calculates the next best question. This way of searching can be stopped at any time by clicking on a link in the bottom right corner; so that all remaining methods will be presented. The search stops when about five methods are found to be appropriate, of which detailed information is available.

<table>
<thead>
<tr>
<th>Selecting principle</th>
<th>Quick method selection based on basic knowledge that one has about the focus, product, project, study and user</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest expected value</td>
<td>For novices; when selecting a method for use in product development practice</td>
</tr>
<tr>
<td>Categorization</td>
<td>No visible categorization</td>
</tr>
<tr>
<td>Contains</td>
<td>All sorts of UCD information</td>
</tr>
<tr>
<td>Updated by</td>
<td>The Design for Usability team tools and techniques are mentioned per method</td>
</tr>
<tr>
<td>Differentiating tools,</td>
<td></td>
</tr>
<tr>
<td>methods, techniques</td>
<td></td>
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</tbody>
</table>
This concept was developed from the idea that companies have a lot of experience and knowledge which they don’t want to share with competitors. When a project is closed or employees leave, the knowledge leaves with them. CompanyCentral enables companies to create an internal database of methods with examples of projects in which they were used and to add classified information. It is also possible to develop company-specific methods and to categorize methods according to internal processes. With three subscription types, users can respectively view, adjust or control the information. The left bar can be used to insert criteria and resources. Views can be changed to support method selection based on categorizations.
4.3 Concept 3: “SocialMedia”

It is not without a reason that social media and collaborative platforms like Stack Overflow and Quora are such a success. It was never before so easy to exchange knowledge. SocialMedia builds on that idea by introducing a visual wiki in which one can zoom in and out to explore methods in adjacent areas. Search is based on tags and categories are changing the number of cards available. Then, selecting a method is based on ratings, reviews and comments of other professionals. Information of each method starts with a general description and a video. For the rest, all information is user generated content in the shape of discussions, examples, proposals for improvement and references.

<table>
<thead>
<tr>
<th>Selecting principle</th>
<th>A Google search engine searches on i.e. rating, source, author, file types after which methods can be sorted and social media can be used to choose methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest expected value</td>
<td>Experts; Exploring and expanding knowledge by discussing and contributing to methods</td>
</tr>
<tr>
<td>Categorization</td>
<td>No visible categorization, but methods can be sorted</td>
</tr>
<tr>
<td>Contains</td>
<td>All sorts of UCD information</td>
</tr>
<tr>
<td>Updated by</td>
<td>A world-wide community of usability professionals</td>
</tr>
<tr>
<td>Differentiating tools, methods, techniques</td>
<td>No distinction is made</td>
</tr>
</tbody>
</table>
4.4 Concept 4: “SeriousGame”

This concept takes the SocialMedia concept a step further. There is no basic content available, but a user builds his personal database by contacting other specialists in his area of expertise; thereby also building on a professional network. Meeting new people and gaining knowledge are central elements in the SeriousGame, with one’s contacts, knowledge and expertise being visible to others as an indication of its ‘status’. All information is user generated and that can be adjusted by the author and the owners of that information. Please note that this concept was not as serious as the others but was designed to elicit responses about contacting other professionals and building your personal knowledge database.

<table>
<thead>
<tr>
<th>Selecting principle</th>
<th>Cities represent disciplines where info on subjects can be exchanged (not only usability) from person to person or via on-line conferences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest expected value</td>
<td>Enthusiasts; As relaxation but with development of one’s professional knowledge as a basis</td>
</tr>
<tr>
<td>Categorization</td>
<td>None</td>
</tr>
<tr>
<td>Contains</td>
<td>All sorts of UCD information</td>
</tr>
<tr>
<td>Updated by</td>
<td>A world-wide community of usability professionals</td>
</tr>
<tr>
<td>Differentiating tools, methods, techniques</td>
<td>No distinction is made</td>
</tr>
</tbody>
</table>

The images are adapted from the game Settlers VI.
4.5 Concept 5: “Connect”

The fifth concept is based on the idea that people already have experience in certain methods or that they have an idea about how to reach a goal or to answer a research question. One selects the product type, phase and research goal that he is working on and six starting points are provided to start the search with. By dragging one of the methods into the greater area, similar methods will appear. Methods will change location based on the given importance on three main resource types; budget, time and staff. Clicking on a method reveals a short overview screen with the ability to see more details and an instruction video. The selection principle and interface design style were inspired by a PhD research of Stappers (2000).

<table>
<thead>
<tr>
<th>Selecting principle</th>
<th>Setting product type, project phase and research goal result in six methods that can be selected as starting points after which related methods can be found according to the constraints budget, time &amp; staff. For competent users; When selecting a method for use in product development practice.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest expected value</td>
<td>No visible categorization</td>
</tr>
<tr>
<td>Categorization</td>
<td>Methods only</td>
</tr>
<tr>
<td>Contains</td>
<td>The Design for Usability team</td>
</tr>
<tr>
<td>Updated by</td>
<td>tools and techniques are mentioned per method</td>
</tr>
</tbody>
</table>

Differentiating tools, methods, techniques
Chapter 5: Evaluating Concepts

The concepts were tested with the industrial partners of the DfU project to find the most practical selection procedure, needed information and useful functions. This chapter discusses the results from these tests according to the research question that they address.

5.1 Research Design

Two duos from each company took part in the study; with one duo being perceived as experts and one duo as novices. Participants came from a variety of backgrounds (Table 5-1). Seven sessions were executed. After an introduction and a general description, each concept was explained and discussed. Finally, all concepts were compared and rated. The order in which the prototypes were presented was changed between the sessions to avoid order bias.

A couple of days before each session, individual participants were requested to fill in a questionnaire about demographics and the importance of some resources (e.g. time and budget) in selecting a method (appendix 5.2). After the sessions, the videos were analysed and interesting quotes were written on cards with an interpretation and reference to the video. The resulting 208 statement cards were categorized among the research questions after which requirements, wishes and ideas for a new design were extracted.

As a gift, all participants got a set of cards about nine method collections (Figure 5-1 and appendix 5.3). On each card, the quality and scope, categorization, selection, explanation detail and background information is shown together with an image of the website, poster or any other form the method collection is presented. The card set is still available to download from bit.ly/DfUcardset.

A lot of quotes from the study are used as a reference and marked as a footnote. See page 96 for the complete overview of the origins of the quotes.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age</th>
<th>Title</th>
<th>Company type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>31</td>
<td>Usability Engineer</td>
<td>Professional electronics</td>
</tr>
<tr>
<td>Female</td>
<td>33</td>
<td>Packaging Designer</td>
<td>Fast moving consumer goods</td>
</tr>
<tr>
<td>Female</td>
<td>36</td>
<td>Innovation Consultant</td>
<td>Consumer electronics</td>
</tr>
<tr>
<td>Female</td>
<td>38</td>
<td>Research Scientist</td>
<td>Fast moving consumer goods</td>
</tr>
<tr>
<td>Female</td>
<td>39</td>
<td>Packaging Designer</td>
<td>Fast moving consumer goods</td>
</tr>
<tr>
<td>Male</td>
<td>20</td>
<td>Intern student</td>
<td>Design agency</td>
</tr>
<tr>
<td>Male</td>
<td>27</td>
<td>Industrial Design Engineer</td>
<td>Design agency</td>
</tr>
<tr>
<td>Male</td>
<td>33</td>
<td>Designer</td>
<td>Design agency</td>
</tr>
<tr>
<td>Male</td>
<td>34</td>
<td>Domain Specialist</td>
<td>Professional electronics</td>
</tr>
<tr>
<td>Male</td>
<td>36</td>
<td>Senior Design Engineer</td>
<td>Design agency</td>
</tr>
<tr>
<td>Male</td>
<td>41</td>
<td>Interaction designer</td>
<td>Professional electronics</td>
</tr>
<tr>
<td>Male</td>
<td>50</td>
<td>Usability Engineer</td>
<td>Professional electronics</td>
</tr>
<tr>
<td>Male</td>
<td>55</td>
<td>Technical Project Leader</td>
<td>Fast moving consumer goods</td>
</tr>
</tbody>
</table>

Figure 5-1: Method collection card-set
5.2 Concept responses

During the last part of each session, all paper prototypes were compared in terms of the general interface design, features and the selection procedure. Participants were asked to rate the concepts on the selection procedure, of which the results are presented in Table 5-2.

Table 5-2: Ratings (1-5, higher is better) given by the participants to the selection procedure of each concept.

<table>
<thead>
<tr>
<th>Session#</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wizard</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>2. Company Central</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>3,7</td>
</tr>
<tr>
<td>3. Social Media</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3,3</td>
</tr>
<tr>
<td>4. Serious Gaming</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>eliminated</td>
<td></td>
<td></td>
<td></td>
<td>2,4</td>
</tr>
<tr>
<td>5. Connect</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>2,6</td>
</tr>
</tbody>
</table>

SeriousGaming was found to be: “cumbersome for obtaining information”¹¹ because “the graphics have nothing to do with what you are doing”¹². In other words: a lack of efficiency. One person was in favour of the concept; “If I (…) look into the heart of the concept, I think that when you can meet people and ask them about a subject can be interesting”³. In a less detailed manner, this feature was also present in SocialMedia, which was also strongly favoured with by the duo. It was decided to elaborate more strongly on these features in SocialMedia and eliminate SeriousGaming.

The reasons given for the rating (of which a summary is provided by Table 5-3) were compared with the remarks that were given during the session. For instance, it was said about CompanyCentral that “you do not need a database for those five methods used by a company”⁴. Databases like these were seen as highly maintenance unfriendly; “I really wonder whether this will be maintained”⁵. However, many participants liked the idea of having a company specific part on top of a centralized database; “It is good to have something internally as well, where internal examples can be communicated”⁶, because “you also want to search on what they used at another project or product”⁷.

Because this was mentioned a lot as a disadvantage, it probably weighed a lot in the rating process as well. Together with positive responses about the simplicity and straight-forwardness of the Wizard concept, this explains why CompanyCentral scored a little less than Wizard.

Table 5-3: Reasons given for the ratings presented in table 5-2

<table>
<thead>
<tr>
<th>Likes</th>
<th>Dislikes</th>
</tr>
</thead>
</table>
| 1. Wizard | Two ways of searching  
Simple, target oriented search | You end up with what you already know  
Too strict, gets boring after some time |
| 2. Company Central | Very extensive  
Good overview with categorizations  
Company specific  
Freedom to select constraints | Information overload  
Expensive and very complicated  
Company database won’t work in practice |
| 3. Social Media | Social media to use for extra information about methods and verification of your choice | Explorativ search demands that you can search good; there are no handlebars |
| 4. Serious Gaming | Community, not only for usability | Can never be used in a serious manner  
Graphics are not in line with content  
Takes too much time to obtain information |
| 5. Connect | Surprising explorative way of searching | You stay within the area of what you already know  
The feature looks like “try this” and could be part of any other concept. |
5.3 A step towards the selection procedure

The method selection procedure as visualized in CompanyCentral was perceived as the most appropriate, because:

1. Searching based on criteria would happen more often and is of more value than exploration;
2. People want to choose a method based on objective information such as the constraints of the project;
3. The process “fits well with a product development process, because you go through that in a very structured manner as well”;
4. The interface was in line with this procedure because it “is how your brain works, from left to right, first constraints than selecting”.

Although the same criteria were used in Wizard, where each following question was determined according to the answer given to the previous question (as in the Dutch tax forms), this was perceived as too strict: “I am not sure if I trust the selection”. However, participants liked the speed and the intuitive use of the concept; because “a method is mostly chosen within 10 minutes”.

SocialMedia’s selection procedure was based on reviews and comments, which was interesting, but also less transparent and cumbersome as we will see in paragraph 5.3.3. In short, user generated content a as a prominent part of the procedure was not seen as the most practical.

The selection procedure of Connect, starting with known methods and expand from there with a basic set of criteria, would also not be a good fit with product development practice. A reason given by an expert was that “you need to have something specific in your head. But when we have something in our mind we usually know what we are going to do”. In addition, novice users do not have sufficient knowledge about methods to create a starting point. Although Connect served as a nice example of how methods can be explored, it showed only one of the many ways explorations could take place which could be part of the final design.

Companies might “have a number of methods that [they use] a lot.” With this as a given, “there are basically two things interesting: To make that nifty a little better each time you use it [and to guide them to] something different”. Both aspects are very important because proper results highly depend on the method of choice and the way it is used. The tool should support this up to a level where practitioners are invited to use the tool for inspiration and exploration on both broadening and detailing knowledge about methods.

It seemed that exploration would be especially of value to the more experienced users (like Joyce) because they are generally more prone to keep themselves updated, less search in a criteria-oriented way or already have (an idea of) a method in their mind. These more experienced users also have the need to try out methods, combine them and tweak them to their situation: “Sometimes we have a method and then we look for a project where we can apply it in”. It was mentioned that "you want to look something up quickly and
thoroughly or use it for inspiration. [There should be] something that allows freedom for both selection procedures.”

This explorative way, where opportunities instead of a step-by-step process are reached out to the user, was envisioned in the ‘SocialMedia’ concept. However, this was found to be “confusing because I do not quite know what kind of results I can expect for the various questions that I can fill in” since exploration depends highly on the creativity and eagerness to learn from the user, a competency that novice users like Martin do not yet have. However, exploration was still favoured by the less experienced, but as an addition to the ‘analytical’ selection procedure.

It seems that exploration and step-by-step selection are counterparts. However, as it turns out, explorative functions could not result in a procedure of some kind because by exploration, users meant that they should be able to ‘try out’ what adjusting a criterion does to the selection and to compare methods in various ways; textually and visually.

With the absence of a clear structure, exploration would not be of use to the many practical oriented users, whose goals are to find a method as quick as possible within the limitations of their situation. This was something that the SocialMedia, SeriousGaming and Connect concepts all lacked. Therefore, it must be directly visible what the results are of what one is doing and about the previous steps that were taken.

It can be concluded that selection should be primarily based on criteria (as also argued by literature being discussed in the first chapter), which was also indicated by literature (page 19). In addition to this, the selection procedure should also include explorative components (as in SocialMedia and Connect) such as verifying the selection by other users’ input or comparing methods at specific criteria. This paragraph therefore further outlines the criteria to select methods, the explorative functions to stimulate and support professional education of the practitioner and the possible implementation of user generated content.

5.3.1 Criteria for selecting methods

Table 5-4 shows an ordered overview of the rating that participants gave to a selection of the criteria presented in chapter 1 (supplemented with criteria of which I thought that they could be important too). It can be concluded that project related criteria are generally found to be very important and that there is much disagreement on whether user related criteria are important or not. However, it is impossible to generalize the information based on only these numbers of (only) thirteen participants and without detailed argumentations for each criterion (although some comments were given). Therefore, the results were used for inspiration only.

Other criteria that were mentioned in the questionnaire or during the sessions were:

1. The type of project;
2. The likelihood that the result of the test will be used to improve the product;
3. The environment that users work in;
4. The number of possible participants;
5. Implementation time of the results of the study;
6. The possibility to physically be present at a study as a researcher;
7. Aspects that one can influence on the design or not;
8. Adjacent or similar products.
Also mentioned was to select methods based on a ‘general method level’ because “you often have a vague idea like a brainstorm and want to search from there”\(^{20}\). This idea is in line with the ideology of the Connect concept. No priority was given to these criteria, but the criteria were considered in the development of the selection procedure.

Using criteria for selecting methods comes with some important issues regarding the representation. Some criteria were “so general that you always end up with the same four or five methods”\(^{21}\). Regarding the values of the criteria as they were presented in the concepts (low-medium-high), companies would always be “low on budget and short on time.”\(^{22}\). In addition, “the danger starts with (...) the criteria where you can adjust a little bit, where you can play around with. [What you enter] is not a clear yes or a clear no; it is more where you are doubtful, where you can put in a maybe”\(^{23}\).

![Figure 5-3: Bar scales in the Wizard concept to adjust the levels of various resources](image)

This means that confidence about the meaning of both the criterion and the input value are very important. Specifying values through quantification was proposed as a possible solution although ‘playing’ with criteria according to a bar scale (Figure 5-3) was also seen as intuitive\(^{24}\), almost playful, which might stimulate use.

### Table 5-4: Overview of priorities given to criteria for selecting methods

<table>
<thead>
<tr>
<th></th>
<th>Project</th>
<th>highest</th>
<th>lowest</th>
<th>average</th>
<th>median</th>
<th>mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research goal</td>
<td>5</td>
<td>4</td>
<td>4,3</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Project phase</td>
<td>5</td>
<td>3</td>
<td>4,1</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Budget</td>
<td>5</td>
<td>3</td>
<td>4,1</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>5</td>
<td>2</td>
<td>4,1</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Available staffing</td>
<td>5</td>
<td>2</td>
<td>3,4</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Team Expertise</td>
<td>5</td>
<td>2</td>
<td>3,2</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Product</th>
<th>highest</th>
<th>lowest</th>
<th>average</th>
<th>median</th>
<th>mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completely new product</td>
<td>5</td>
<td>3</td>
<td>4,0</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Similarities with other products</td>
<td>5</td>
<td>2</td>
<td>3,2</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Complexity</td>
<td>4</td>
<td>2</td>
<td>3,1</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Type (e.g. interface or product)</td>
<td>5</td>
<td>1</td>
<td>3,0</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Users</th>
<th>highest</th>
<th>lowest</th>
<th>average</th>
<th>median</th>
<th>mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>If there is access to users</td>
<td>5</td>
<td>1</td>
<td>3,6</td>
<td>4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>If they are familiar with similar products</td>
<td>5</td>
<td>1</td>
<td>3,2</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Whether they have disabilities</td>
<td>5</td>
<td>1</td>
<td>3,2</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Cultural background</td>
<td>4</td>
<td>1</td>
<td>3,0</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Age range of the users</td>
<td>4</td>
<td>1</td>
<td>2,7</td>
<td>2,5</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Other</th>
<th>highest</th>
<th>lowest</th>
<th>average</th>
<th>median</th>
<th>mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our familiarity with a method</td>
<td>5</td>
<td>2</td>
<td>3,0</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>If the method was recommended</td>
<td>5</td>
<td>2</td>
<td>3,0</td>
<td>3,5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Explanation of the method</td>
<td>5</td>
<td>2</td>
<td>3,2</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>If the method is new to me</td>
<td>4</td>
<td>2</td>
<td>2,7</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
5.3.2 Explorative functions as part of the selection procedure

Exploration is a valuable element in the procedure as they can contribute to the broadening and detailing of the knowledge of the practitioner. Participants pointed out that they “would like to be challenged by the system. If the interaction is a routine of filling a list, then I end up with what I already know”\(^\text{25}\). A strong way to challenge users can be achieved by linking methods together\(^\text{26}\): “I can sit really long on Wikipedia. Why… because everything is linked together. (…) At the end, I sometimes don’t remember where I started”\(^\text{27}\).

Ultimately, it depends on the way the user interacts. When he goes back and forth in entering values for criteria and adjusts the categorizations from time to time, than we can call that exploration. Explorative functions are therefore not in the same way related to the selection procedure such as entering criteria values. Each step in exploration would increase the understanding of (the relation between) methods to the user in a playful and challenging way. Also, providing practical pieces of information about the execution and the potential results of the method and linking methods together could result in users to gather more information out of curiosity.

CompanyCentral had three ways of visualizations in which relations were shown by the category that methods belong to: project phase, user involvement and expertise. They were intended to let people understand the differences between methods without having to obtain detailed information. The categories were visualized in the horizontal axis, vertical axis and colours respectively. However, people were not sure how three simultaneous categorizations would be of help, although it became clear that placing methods randomly in space (as in SocialMedia and Connect) was very difficult to understand because people automatically want to give meaning to the items’ appearance, location and dimensions\(^\text{28}\).

It was said that “you need something where you can see what the differences are at a glance”\(^\text{29}\), as this would create awareness for the differences between methods and ease the decision making process. CompanyCentral had a comparison overview implemented as one of the steps in the selection procedure (Figure 5-4). However, this was perceived as an extra and unnecessary step one needed to go through by some of the participants. This implies that an optional comparison overview could have more potential.

![Figure 5-4: The comparison overview of CompanyCentral](image)

As such, it can be said that exploration could be intertwined in a structured selection procedure by linking methods together, visualizing and categorizing methods in various ways and by easily un-doing a criteria. By offering user input at each of these components (e.g. by clicking on one of the visualized categories), various manners in which criteria can be entered to the system are provided. By doing so, a larger target group will be pleased as every individual has personal search preference. In the end, this might inspire users to tweak their inputs and to spend more time with the application.
5.3.3 The potential of user generated content in the selection procedure

Participants said that it would be helpful to “see other people's experiences with products. If I go on vacation I use various sources of reviews to see how this was and how that was” and “if [a similar company] uses this method quite often, than it might be interesting for us as well.”

However, the use of reviews comes with some difficulties because for you to know that another company uses a method requires that the organization shares their project information and that someone will enter reviews after each project has been finished.

Also, finding information via comments can require you to read many comments to find out that a method was not of help because it was used for another research goal than the method was developed for. I believe that this decreases the credibility of the system.

In addition, less experienced practitioners will not share their thoughts and experiences because they do “not feel comfortable enough to say something about a method.” The experienced practitioner, on the other hand, is more able to find his own mistakes in using a method and will therefore less draw bad experiences to the method itself. The result is that their reviews will be more positive than the reality actually was. In both cases it is the context of how one is writing a review and the other one is interpreting that review that makes or breaks it. People might value criteria from another perspective than yours, thereby drastically decreasing the value of comments like those that were implemented in SocialMedia (Figure 5-5).

And even when you do find a well-reviewed method, remains the issue that new or less popular methods will get less attention form the users. This is because "when you do not use a certain number of methods you cannot recommend it. So if you haven’t tried a method because it is outside your expertise, although it may be a fantastic method, it doesn’t get any recommendations. It leads you down to an alley that makes you feel comfortable because everyone else is doing it, but it may not be the best." In a system where we are striving to support the decision-making process by a (semi-)objective selection procedure, this cannot be wished for.

Therefore, I believe that offering rates and reviews can result in the very opposite of what we are trying to achieve. This does, however, not mean that reviews should be completely excluded; just that it is not wise to use them within the selection procedure where it would become a criterion that users will value to be true.
5.4 The method information that needs to be given to the users

The first impression can determine whether a method will be used or not. This also accounts for the very first lines that a user will read; it determines whether he will read further or if he will delete the method. This does not only mean that all methods should ‘look good’ but that they should be equal because the decision making process should be fuelled by cognition over emotion.

But what is the information that people want to have at first? Mentioned was a short description of the methods’ purpose and indication of the necessary budget, time and staff. From then on, however, experienced practitioners might need other information than those with less experience with involving users into the product development process. Experienced users need a general overview, an example and some considerations so that they can implement it in their process or combine (the idea of) that method with other methods that they use. Inexperienced users might also need instructions, example cases, pros and cons and equipment. Equipment is important because “for some methods you do not need that much; some ideas, a paper and a pen and you are good to go. For other methods you might need a complete usability lab”. References, comments and links to other methods were seen as an extra aimed at researchers. Giving information in layers works best, but giving it all at once was considered as an overload (Figure 5-6).

In many companies budgets are tight. When a more expensive method is being recommended by the system it is important to have convincing information for upper management: “If we can argue that it is important that this method should be carried out, we can almost always execute the method”. This information can be that important that it can result in an increased budget, more time or other criteria being altered to the goals of the study and the needs of the development team.

Figure 5-6: The extensive information page of the CompanyCentral concept that was an 'overload'.

Although one of the participants had a wide experience with focus groups, he mentioned that “when this thing tells me to do a focus group, I still don’t know how to execute the method yet because you have so many ‘sub-methods’ within a focus group…” This does imply for a need for information based on the context in which the method can be used, the varieties of a method and the different ways to implement it in practice.

Figure 5-7: The methods were given a rating based on the users' input in the Wizard concept, but without explanation.

If an overall rating for how much selected methods match with the criteria as used in Wizard, than this rating needs to be explained (Figure 5-5). This could for instance mean that the sub-ratings for each criterion are shown or an explanation is given why it got that rating.
5.5 Conclusions

This study showed that a combination of the concepts could support the method selection procedure at best. The lists below summarize the key-findings that were discussed in this chapter.

Similar initiatives:

- The uptake of method collection tools is very low, explaining the low uptake of newly introduced methods;

Selection procedure:

- Selecting methods based on research goal and resources seems the most practical;
- Offer free order of input (no strict step-by-step order as in Wizard);
- By linking methods together and offering multiple categorizations via visualizations, users will be triggered to explore new methods;
- User generated content such as reviews and ratings are not functions to be implemented in the selection procedure, but remain to be interesting for method information;
- Use one general database that is accessible by all users and editable by a group of professionals;

Method information:

- Information should be given gradually, showing the purpose and the required resources for a method first;
- The tool should give information about the execution of the method in such a manner that the user can execute the method appropriately;

Interface design:

- As a basis, the CompanyCentral concept could be used (without the company database), with additions from Wizard (simplicity) and SocialMedia (explorative interaction);
- A bar input for setting criteria seems to work the most intuitive, although the input values need to be explained.
6 Creating the selection procedure

As a result from the concept test studies, a selection procedure based on the research goal and limiting factors such as budget and time was seen as the most appropriate approach. This chapter outlines the selection procedure that was created as such.

6.1 Criteria-oriented search and exploration combined

As a result from the previous study, the criteria-oriented approach would have clear steps and a clear goal as envisioned by the ‘Wizard’ and ‘CompanyCentral’ concepts. By including explorative components in this procedure, we would stimulate users to educate themselves about methods.

A detailed overview of the user interaction possibilities is needed to understand when and how particular tasks could be executed and where supporting functions could be implemented. Task analysis diagrams are very suitable to show how one particular task is executed in a system. However, with exploration being defined as “the ability of going back and forth in the selection procedure at any time”, the explorative character of the tool would require an endless number of diagrams. A state flow diagram shows the logical flow of information through a system and is therefore not user-oriented, but system-oriented.

By combining both ideas, I visualized the selection procedure in the task flow diagram below (Figure 6-1). The diagram shows the options and type of action a user can make at each step in the process. By ‘moving’ through the application, one interacts with various elements in the interface, which are represented by grouping similar elements. The diagram is divided in three levels to represent three main steps in the selection procedure: inserting criteria, selecting a method and being informed about a method.

Figure 6-1: Diagram showing possible user interactions
6.2 Selection Criteria

On page 19, I outlined several important factors in method selection which were included in literature. On page 35, I showed a set of criteria that was categorized by participants of the concept evaluation study.

Table 6-1, as a result of this process, outlines the criteria categorized based on the type of the criterion, together with their values. Note that the criterion “project phase” is not present in the list. The reason for this can be found in the fact that every company claims to use a different process with other number and type of phases. By deliberately excluding it from this list, I wanted to test if participants of the next study would miss the criterion. Project phase was

<table>
<thead>
<tr>
<th>Research Goal</th>
<th>Research Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Type</td>
<td>Multiple Choice</td>
</tr>
<tr>
<td>Values</td>
<td>Learn who the users are, Learn what user needs are, Learn about the context of use, Learn about current product use, Design concepts</td>
</tr>
<tr>
<td>Design specifications, Design a workflow or procedure, Evaluation concept(s), Evaluate a working prototype</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project</th>
<th>Project</th>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Type</td>
<td>Available Budget</td>
<td>Available Time</td>
</tr>
<tr>
<td>Values</td>
<td>€0-100.000</td>
<td>0-12+ months</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product</th>
<th>Product</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Type</td>
<td>Product type</td>
<td>Size</td>
</tr>
<tr>
<td>Values</td>
<td>Interface, Tangible product Environment Service</td>
<td>1 (hand-held) to 5 (room)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Study</th>
<th>Study</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Type</td>
<td>Physical Presence</td>
<td>Study Location</td>
</tr>
<tr>
<td>Values</td>
<td>Yes, No</td>
<td>Desktop, Remote, Meeting Room, Usability Lab, Field location</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participant</th>
<th>Participant</th>
<th>Participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Type</td>
<td>Participant number</td>
<td>Age Range</td>
</tr>
<tr>
<td>Values</td>
<td>0 – 50+</td>
<td>0 - 100</td>
</tr>
</tbody>
</table>
substituted by Research Goal, with the idea that practitioners want to acquire specific information to answer a research question or to solve a problem.

Table 6-2 shows a number of criteria that were not included in this initial list. These criteria were either part of last study, requested by the participants in earlier studies or thought of by the author. All of them were eliminated because they were either ranked low by the participants in the previous test, was not expected to have the potential to decrease the amount of methods significantly and/or there was no data available about the criterion at the time this list was developed.

Starting with a small list (although still quite extensive) is more logical than with a long list. The idea was that if participants would miss criteria during the next test they would ask for it. In addition, by giving all options (even the highly discussable ones) would likely be either an overload or might return in responses like ‘sure, that is useful, why not?’, which is of no use in this project.

<table>
<thead>
<tr>
<th>Added by:</th>
<th>Literature</th>
<th>Participants</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eliminated because:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low elimination potential</td>
<td>-</td>
<td>- The type of project; - The environment that users work in; - New or follow-up product</td>
<td>- The cultural background of participants.</td>
</tr>
<tr>
<td>No data available</td>
<td>- Implementation time of the results of the study; - The information a method produces; - How the results of the study can be communicated.</td>
<td>- The likelihood that the result of the test will be used to improve the product; - Aspects on the design that can be influenced; - Adjacent or similar products.</td>
<td>- Client pressure.</td>
</tr>
<tr>
<td>Highly contextual dependent</td>
<td>- Our familiarity with a method.</td>
<td>- If the method was recommended; - The way a method is explained;</td>
<td>- If participants are familiar with similar products; - If the method was recommended.</td>
</tr>
</tbody>
</table>
6.3 Input Values

With the list of criteria, their order and their values being set, the next step is to define how the system should be handling the user inputs. In general, there are three criteria types: single choice, multiple choice and scaled criteria. Single and multiple choice criteria are criteria where the database can answer the request with absolute figures; “yes, the value is present” or “no, this value is not present”. For example, if a user check a box called “no access to users”, all methods in the database should be checked for the value “no access to users”. This would result in all methods with user involvement to be withdrawn from the selection.

The input value for scaled criteria is in the form of a range (e.g. between 5 and 20 days for the time criterion). There are three subcategories visualized in Figure 6-3, which compares various situations where the input value of the criterion (labelled “I”) is being compared with the corresponding values for a method in the database (labelled “M”). First of all, the method can be a match (marked green) or no match (red) with the input values. Because this will ultimately result in a visible or a hidden method, this looks a lot like a single input value such as “true” or “false”. This process, how these requests are being handled by the database, is shown in Figure 6-3.
But what will happen in practice more often is a partial match. They can be identified by the method value crossing one of the constraint values (Figure 6-4). When this happens the method might still be possible, but with certain limitations. For example, a method might be suited for medium-sized products, but less for small and large products (Figure 6-4, right). Or conducting a questionnaire within a week might still be possible, but you can only use the results for inspiration and not for statistical analysis (Figure 6-4, left). The latter implicates that there some constraint are linked with each other and that method values can vary as a result. This has less to do with ‘Dumes thinking for the user’ in that way that the reason for values being connected should come from practice.

A calculation could determine the degree in which the method matches; the size of the method value between the input values as a relation of the total method scale. A resulting value would then be used by the system to determine whether it should hide or show the method. It seems cumbersome to develop and implement this correctly, especially because users expect Dumes not to think for them.

By introducing a calculation that would rule methods out based on such hard data, users could get a mixed view. Input values can be adjusted by a single pixel to make the method appear or disappear from the selection without visible argumentation. This can create uncertainty and disbelief in the calculation, like it was mentioned by one of the participants or study 2.1: “I am not sure if I trust the selection”.

This is a very difficult element in the selection procedure. It is unclear if such a calculation is needed to significantly decrease the amount of methods; setting a selection of the described criteria can already be sufficient. It is necessary to find out if users would end up with an appropriate method and if they would execute it correctly without these ‘grey areas’. This would, however, not be possible until an extended database and a working prototype exist. In addition, introducing the algorithm to calculate the appropriate methods according to the conditional matches could result that the tool would ‘think for the user’, decreasing the trustworthiness of the selection procedure. It was for these reasons that it was decided not to develop a calculating mechanism for the partial matches (although a first sketch of it has been made in appendix 5.4). Criteria values are considered as a complete match; letting the user to make the decision by himself.

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*Figure 6-4: Overview of input values and method values with a 'core' and an 'edge'*
6.4 Method Information

As seen in paragraph 5.4 (page 38), an important part of the selection procedure is when which type of information is presented to the user. The list on the left outlines the information ‘bits’ that are presented during and right after the selection (as an initial overview) and the information that is included on a detailed method page.

- Initial Overview
  - All criteria values (as a feedback)
  - A short description with the purpose of the method

- Detailed Information page
  - Featured video (five minutes that shows the essence and an example)
  - Detailed description with advantages and disadvantages
  - Instructions
  - Examples
  - Considerations
  - Downloads
  - References
7 Evaluating the selection procedure

To test the selection procedure that was presented in the previous chapter, a workshop was held at the Chi-Sparks conference on June 23. The test was conducted with the first working prototype of the tool, based on an existing platform. This chapter explains the prototype that was used and the results of the study.

7.1 Research Design

Twenty professionals from various industrial companies (appendix 7.1) were participating. Participants ranged from 23 to 42 years old and were from various backgrounds within such as usability specialists, interaction designers, students, lead UX designers, Phds and ergonomic advisors. All participants received a copy of the Method Collection Card-set (Appendix 5.3) as a gift for their input. The session was not recorded, but notes were taken by the researcher during the session.

The session started with a discussion about method collections, the way that users currently search for a method and how search could be like. After that they were asked to work in duos to find a method in a working prototype according to one of the three cases (appendix 7.2). Participants used a form (appendix 7.3) to answer questions about the selection procedure after each major step. The prototype was filled with methods and detailed information. An unpublished paper about the workshop is available through appendix 7.6.

7.1.1 Platform for testing purposes

In a search for existing solutions that make large amounts of data searchable, I stumbled upon a platform that seemed to match with most requirements at the time. The Microsoft Silverlight PivotViewer platform (hereafter: PivotViewer) “makes it easier to interact with massive amounts of data on the web in ways that are powerful, informative, and valuable” (Microsoft 2011). Examples of the platform at various websites (e.g. http://netflixpivot.cloudapp.net) showed the potential of PivotViewer as a visual search engine by a set of criteria (see also appendix 7.7).

I created an excel database with the values for each of the criteria per method (appendix 7.4) and, as far as the platform permitted, I adjusted the interface and some functionality to match our wishes for the study. I introduced two levels; the selection level (Figure 7-1) and the information level (Figure 7-2). At the selection level, users could insert values for criteria according to the list on page 42 and see a direct result of their actions as the number of ‘methods cards’ decreases. Clicking on a method card would bring the user to the information level, where detailed information about the method was shown according to the list shown at page 46.

The working sample is still available through http://bit.ly/DfUexplore. As it was developed for testing purposes, and the information within it was not validated, I strongly recommend not using the sample for professional purposes.
Figure 7-1: The selection level of the prototype that was used for the study, based on PivotViewer with sample data.

Figure 7-2: The information level of the prototype that was used for the study, with sample data.
7.1.2 Method Selection

The selection of methods that was included in the test held two purposes: test the selection procedure based on criteria and test the types of information that were provided to the user as a result from the selection procedure. Testing the selection procedure would need methods to differ on all criteria, whereas for testing the information it was needed to include detailed information about each method. As such, a set of methods was established that would differ on many of the important criteria and of which detailed information was available through the similar initiatives. Table 7-1 summarizes the selected methods that serve both goals.

The information pages were developed with the data from the similar initiatives. The values in the database for each criteria and method were also extracted from the similar initiatives or it was developed by the author based on his experience and knowledge when the particular information was not available.

Figure 7-3: During the workshop, all participants could use the prototype to find a method for the situation of the case.

<table>
<thead>
<tr>
<th>Method:</th>
<th>Main research goal category:</th>
<th>Learn</th>
<th>Design</th>
<th>Evaluate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper Prototyping</td>
<td>Learn</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Focus Groups</td>
<td>Design</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Field Ethnography</td>
<td>Evaluate</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Shadowing</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Participatory Design Workshop</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Card Sorting</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Task Observation</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Questionnaire</td>
<td></td>
<td></td>
<td>X</td>
<td>X X</td>
</tr>
<tr>
<td>Cultural Probes</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Critical Incident Technique Analysis</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Heuristic Evaluation</td>
<td></td>
<td></td>
<td>X</td>
<td>X X</td>
</tr>
<tr>
<td>Customer Service Feedback</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Personas</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Hierarchical Task Analysis</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Process Flow Chart</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

**Totals**: 22 (7,3,5) 9 7 7
7.2 Results

During this study, information was gathered regarding to similar initiatives (research question 1), the search for a method and the selection procedure within the prototype (rq 2), the information given by the system (rq3) and the interface design of the prototype (rq4). This paragraph discusses the outcomes according to the research question that they address.

7.2.1 What we learned from similar initiatives

Method collections were barely mentioned as a source for method information. From the twenty participants, eleven knew at least one method collections from the selection shown at page 13, only four participants knew two and two participants knew three or more collections. These figures show an even lower uptake than in the previous study (page 15). The Ideo method cardset (Figure 7-4) was by far the most known collection.

Four participants claimed to have used a method collection in one of the last four projects, which raised the question what was understood by ‘using’ a collection. Several participants said that they mostly do not follow the descriptions given in the sources, but that they combine various methods and other information to their personal, tailor-made, solution. As such, it seemed that the information that is being provided is used more for inspiration rather than execution.

In whatever way the collections were used, the use was not always satisfying. A given example was the Ideo cardset, where there is no help in choosing a method and which only includes a very general description about a method. There is no support in executing the method and there are no examples, which are said to be essential in deciding the value of the method and deciding which elements of the method you want to use and which you are leaving aside. So, however it may seem counterintuitive that users only use the information for inspiration but are not satisfied with a cardset designed for inspiration only, it shows that it comes down to the level of detail of the practical information that we give to users. The Ideo cardset does not give enough information and as a result, people will use their own experience and alternative sources to create their own derivative of a method.

Figure 7-4: The Ideo method card-set.
7.2.2 About selecting methods

The way how many participants search at this moment is by entering their goal or problem in Google. This sometimes leads to useful descriptions of how people dealt with similar problems, related to user centred design or not. Search strings are changed iteratively until one has found what he is looking for. Although it is expected that this is time consuming and that the reliability of the results is questionable, this way of searching could feed the learning process. In addition, the examples that are found in this way are said to be useful because they are often based on first-hand experiences. Participants therefore pinpointed that practical examples of the entire method execution would be of great help to the trust and confidence that one is trying to find when searching for a method.

Other ways of searching involved reading books about methods and asking someone of which the opinion is valued. A more creative way was to draw, think and consider you out of the problem by analysing the problem and the goal that you want to achieve, which results in a tailor made method. This procedure might require both creativity and analytical skills, but this “doing-it-yourself” might also contribute to the professional skills of the practitioner than “filling in a list of constraints”.

All participants were asked to try out the selection procedure with one of the three cases (appendix 7.2). Only a few groups ended up with the method that I thought they would or, even worse, with a method that did not fit with the situation as described (appendix 7.5). Some participants started with the ‘wrong’ research goal. This can be caused by the way the cases could be interpreted, but could also be caused because the input possibilities in the criteria bar were not interpreted as expected. One duo entered almost all research goals because they “already have concepts and that they want to test them”, which was actually true for the case but inserting ‘creating a workflow or procedure’ does not make much sense.

Another reason that participants ended up with an inappropriate method could be found in the fact that the project phase criterion was deleted. Although nobody missed the criterion consciously, the unconscious expectation of it could result in entering inappropriate research goals as they are less in line with the product development process. This shows that it is extremely important to clarify the meaning of the research goals in terms of the basic design cycle of Figure 3-5 on page 22, as this starting point is crucial for the following possible steps.

Another interesting result from the study is the interpretability of the Time criterion. Some participants thought that it was about the total time span of the study (e.g. several months for an ethnographic study), while others believed that it was related to the time that the team would be busy with executing and analysing the study (e.g. forty hours for setting up, executing and analysing two focus group sessions). The difference between both is important because a method that requires a large time span can still require a small amount of man hours to execute; e.g. an on-line questionnaire for hundreds of participants with season-dependent questions of which the answers are automatically processed in an excel sheet. As a result, it was requested to include both the time span and the man-hours in the selection criteria.

More feedback on the selection procedure is provided in Box 7-1.
7.2.3 Preferred method information

Although all participants were clear that the method information should be as concise as possible, a long list of preferred information bits was developed (Box 7-2). Note that a lot of the preferred information is not yet available for a high number of methods (marked as *). A one-pager was mentioned as it could provide a quick overview of the method, its execution and needed resources such as the time and cost.

Although most participants claimed that the currently provided information - copy-pasted from various method collections - was not suitable for execution of the method, more than half of the teams were feeling confident about executing the method. Almost all teams were confident that they could convince their boss because they could use the videos, advantages and approximate budget and time that were given in the information page.

**Selection Procedure feedback**

- Displaying costs for a method is very tricky; it highly depends on how it is implemented;
  - In combination with other methods;
  - Only specific parts of the method;
  - Quick and dirty or very thorough;
  - First time use versus experienced use.
- How can you spread a budget of 10.000 euros over multiple methods?
- The information about budget and time for the Persona method assumes that you already have information; either include the information gathering process in it or clarify which methods one should use beforehand;
- Compare methods is not supported, need to switch all the time between the selection level and the information level;
- Instructions really depend on the situation, and are not always found to be too general at this point.

**Preferred method information**

**New Items:**

- What you can accomplish
- What it exactly measures*
- Respondents needed for ‘valid’ results*
  - Quantitative: statistics
  - Qualitative: ‘trustworthy’
- Expert reviews of methods*
- Both workload (man-hours) and runtime*
- Case studies*

**Existing items, implemented:**

- Type: evaluation or discover?
- Budget*
- Instructions (how-to)
- Product type/sector
- Templates and downloads*

**Existing items, future:**

- Testimonials, and experiences from other professionals*
- Benefits/ROI for business performance*

Box 7-2: Feedback gathered in the workshop regarding the selection procedure

Box 7-1: Preferred method information by the Chi-Spark workshop participants in random order and without differentiation between selection criteria and details.
7.2.4 Interface to support the selection procedure

In addition to feedback solely on the selection procedure and the information that the application gives, participants responded on the interface design of the tool.

A lot of feedback was related to limitations in the PivotViewer platform. A good example can be found at the Budget criterion, where the initial idea was to give possible ranges as a value (e.g. a method costs between 2000 and 5000 euro). However, the PivotViewer platform did not support such ranges (only a ‘yes’ or ‘no’ for fixed values) and five categories were shown instead. These five categories, however, do not have a meaning when they are not being explained. Users were expected to guess what a small amount of time and a large amount of time would be; is that category 1 or 5? The choice of which category to choose should be simplified by making the categories explicit and explain each category.

Figure 7-5 shows that all criteria are visualized as one single list. This list was perceived as ‘overwhelming’ and ‘unsupportive’ by the participants of the workshop. Overwhelming because all 12 criteria are available at once and unsupportive because there was no structure provided to insert criteria in a sequence. Figure 7-5 also shows that when a criterion is closed; there is no overview on what value has been entered to that criterion.

Figure 7-6 shows three issues that participants of the workshop were struggling with. The difference between the left and right situation is that the Time criterion has been adjusted, while there is no change in trading cards. The bars are visualizing the number of methods available for each value; one method has value 4 while both methods have value 3. This is related to the data-oriented approach of the PivotViewer criteria panel; it shows the sum of values of all methods for that criterion. At this time in the process of method selection, the user is solely interested in inserting his resources. Presenting the user how each method relates to the inserted values is one step ahead in the process and was found to be confusing. In addition, the user expects that something will change because he ‘removes’ one of the bars. Therefore, the general recommendation is to remove the bars or to clarify the meaning of the bars.

<table>
<thead>
<tr>
<th>Interface feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Scale categories are highly interpretation dependent; what is a lot and what is not?</td>
</tr>
<tr>
<td>- Clicking on the red cross of the criteria panel deletes all information and there is no way back, while the intent was to close the left bar</td>
</tr>
<tr>
<td>- Detailed information must appear on the same page, otherwise you have to many windows open</td>
</tr>
<tr>
<td>- The information on the right panel should not be clickable (deletes results)</td>
</tr>
<tr>
<td>- Add blank cards to make personal method information</td>
</tr>
<tr>
<td>- Visualize information in the right bar instead of plain text</td>
</tr>
<tr>
<td>- There is no function to share method information or links to search results</td>
</tr>
<tr>
<td>- Support with an easy ‘undo’ function</td>
</tr>
<tr>
<td>- How to connect cards and make your own timeline?</td>
</tr>
<tr>
<td>- One pager needed; quick overview without tabs</td>
</tr>
<tr>
<td>- Example tab should also include possible outcomes (case studies)</td>
</tr>
<tr>
<td>- Select methods that are alike directly when you mouse-over a trading card</td>
</tr>
<tr>
<td>- Discussion forum with expert reviews, testimonies, professional experiences and ratings</td>
</tr>
<tr>
<td>- Show related methods (was not found by the participant)</td>
</tr>
<tr>
<td>o Methods alike</td>
</tr>
<tr>
<td>o People that used this method also used...</td>
</tr>
<tr>
<td>- Use HTML5 for tablet use and to get around refresh issues</td>
</tr>
<tr>
<td>o Information page does not fit on smaller screens (resolution)</td>
</tr>
</tbody>
</table>

Box 7-3: Feedback gathered from the workshop regarding the interface design
The second issue displayed in Figure 7-6 can be found at the number of bars. There are two, while the range is from 1-5. The PivotViewer platform does not show the values that are ‘out of range’ because of values that are already inserted at other criteria. Again this sounds logical from a data point of view because there are no trading cards within these values, but the user expects to see the full range in order to experience what has been removed in that criterion because of the input he gave at previous criteria. This feedback is important in learning how methods and criteria are related. The recommendation is to show the entire range in which the areas that are out of range would be marked.

The third issue visualized in Figure 7-6 is that the current Pivot solution is to freely adjust the area, even to a place within one value (Figure 7-6 bottom; where the handle is in the middle of the second bar although that value is off). Because values can either be on or off, and not partly on as is suggested in the figure, it decreases the ability to understand the meaning of the categories provided.
7.3 Conclusions

This study showed that a selection procedure according to a set of criteria works in practice, but that it still needs a lot of improvements. The lists below summarize the key-findings that were discussed in this chapter.

Similar initiatives:

- The uptake of method collection tools is very low, explaining the low uptake of newly introduced methods;
- Similar initiatives lack a good support of selecting a method and applying the method in practice;

Selection procedure:

- Selecting methods based on product type, research goal and resources is the most practical;
- Clear explanations of all criteria and criteria values are needed to avoid wrong interpretability of the terms that could result in inappropriate method results;
- Budget is a difficult criterion that depends on many factors;
- Time must be split into timespan and man-hours, to distinguish the overall time of the study and the workload of the researcher;

Method information:

- The information page should appear as an overlay instead of a new screen to maintain the connection with the selection level;
- The introduction video and the list of method values are considered to be a good overview;
- However, a one-pager (as a print-out) with the purpose, advantages, disadvantages, in and output would be better to have a comparable overview of the method;
- The information should be more execution-oriented;

Interface design:

- The offering of free order of input is perceived as a nice way of interaction, but the current list lacks any guidance and is overwhelming;
- A lot of issues with the standard PivotViewer interface design, such as the visualization of the input bars and the fact that the criteria panel is data-oriented rather than user-oriented.
8 Interface Designs

Fueled with the feedback on the selection procedure and the PivotViewer interface design, it was time to develop interface designs that would support the selection procedure. This chapter discusses two interface designs that were developed for testing a variety of functions and possibilities in the upcoming test.

8.1 Introduction

Unlike many other projects that evaluate a single design in their final evaluation phase, two interface designs were developed for the evaluation study. The reason for this can be found in three aspects:

- The interface design style of the PivotViewer platform was not supporting the selection procedure. Were our design solutions a necessity or could they be neglected? Could we use and expand the PivotViewer platform or should we develop the tool from scratch?
- Multiple solutions were developed that addressed the same problem, while it was yet unknown which proposal would work best in practice;
- By discussing two possible solutions, we intended to stimulate the participants’ creativity in their feedback. It became possible to respond with design guidelines or with a personal proposal for the interface design element as it would in a co-design session. This would be harder to accomplish when one single solution was presented, as imagination is triggered better when various options are offered

This chapter further outlines the design proposals Pivot+, which was based on the capabilities of the PivotViewer platform and its counterpart Tovip, which was a developed with complete design freedom. Both design proposals are divided in two levels in which a user can be present. In the selection level, a user can enter criteria and view basic information in order to select a method. In the subsequent information level, the user is able to find detailed information about the method. The differences between the two interfaces are further described in Table 8-1.

The designs were developed purely for testing whether the design would support the basic principle of method selection. Therefore, the Tovip design proposal does not intent to be an ideal interface in any way, but intents to visualize other possible design solutions that were not yet tested. In addition, a range of functions were deliberately not implemented in the designs in order to focus on only that what needed to be tested. These functions are however discussed in the recommendations section of this thesis. The colour schemes of both proposals are equal to exclude any preferences for specific colour combinations.
Table 8-1: Overview of the differences between the two final interface design proposals

<table>
<thead>
<tr>
<th>Solution → Function</th>
<th>Pivot+</th>
<th>Tovip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criteria location</td>
<td>Left bar</td>
<td>Top bar</td>
</tr>
<tr>
<td>Criteria input</td>
<td>Categorized on order of input</td>
<td>Categorized on type</td>
</tr>
<tr>
<td>Criteria values</td>
<td>Buttons and list</td>
<td>Scale and list</td>
</tr>
<tr>
<td>Available methods</td>
<td>Change directly when a criterion is inserted or adjusted</td>
<td>Change directly when a criterion is inserted or adjusted</td>
</tr>
<tr>
<td>Visualizations</td>
<td>Grid and Bar visualization, categorization based on all criteria as in MS Pivot</td>
<td>Grid, Graph and Table visualization</td>
</tr>
<tr>
<td>Sort cards</td>
<td>On all criteria</td>
<td>Idem, also on best match</td>
</tr>
<tr>
<td>Trading card design</td>
<td>With short introduction</td>
<td>With main criteria</td>
</tr>
<tr>
<td>Favourites</td>
<td>Direct access when hovering, as a separate function</td>
<td>Clicking on link on trading card, implemented as a selection criterion</td>
</tr>
<tr>
<td>Detailed information</td>
<td>Criteria value panel on the right and detailed information page (overlay) with fixed information with a one-pager as download option</td>
<td>One-pager and detailed information page (overlay) that starts with a one-pager and where other information is input-dependent</td>
</tr>
<tr>
<td>Additional functions</td>
<td>Print, Share, help, personal notes, undo button, discussion forum</td>
<td>Share, print, link, notifications, help, account settings, breadcrumbs</td>
</tr>
</tbody>
</table>

8.2 Pivot design proposal

The results of the last study show that the selection procedure is not supported by the standard interface of the PivotViewer platform. Therefore, the PivotViewer interface was adjusted. The design included elements that were considered a necessity, although it was yet unknown if they would be possible in an upcoming version of the platform.

Because Research Goal, Product Type and Access to Users are the first criteria that people *can* enter with absolute certainty and people really want to insert Timespan, Man-hours and Budget, the criteria were ordered in this sequence. A set of basic, common, resources are distinguished from other more detailed criteria. This hopefully increases the overview of system and gives a clear guidance on what to enter first as well.

This paragraph further outlines the most important screens of the concept. All screens are available through appendix 8.1.
8.2.1 The Selection Level

Criteria Panel:
The criteria panel is located at the left side of the screen. Subpanels with arrows have been made to guide the user through the most important items of the selection procedure, starting with the criteria that are the easiest and most common to fill in. The panels can be minimized to make room for more resources. Each criterion has a description. Entering criteria such as Budget and Time Span go by five buttons that represent five categories from low to high. A keyword filter is present that enables the user to filter on keywords as well.

Top Bar:
The top bar includes two different views just as in the PivotViewer platform: Grid and Bar (see screenshot on the left). The Bar view (smaller image) sorts the trading cards in a way that is selected in the sort drop down menu on the top bar. Furthermore, an undo button, zoom functionality and print, share, link and settings functionalities are provided (note subject of the upcoming study).
8.2.2 The Information level

Trading Card:
The images of methods are called ‘trading cards’. These trading cards are developed to match with the requirements that users gave during the concept tests earlier in this project; an image, a title and a two-line description of the essence of the method. This trading card design intends to match with the creative and ‘designerish’-mind of the user by adding layers of information in the shape of a paper and a post-it on top of it.

Details Panel:
When a user clicks on a trading cards or zooms in on it, a detailed overview of all method values for each criteria is shown on the right. This corresponds to the functionality within the PivotViewer platform, although the information is use-focussed by the indications of the budget and time in figures and by describing the needed experience in detail. More information about the method is accessible by clicking on the top right links or by double clicking on the image, which brings the user to the information level.

Top Bar:
The top bar changes to make show only the appropriate functionality: going back to the selection level, directly select the information page from another method, add the method to your favourites or print or share the method.

Information Overlay:
The information is placed as an overlay on top of the selection level to maintain the cognitive contact with this level (as requested by participants from study 3.1). The information is displayed underneath various tabs. Note that the introduction includes a list of the criteria values applicable to this method and that featured videos are available through their own tab, instead of being visible all the time as with the prototype of study 3.1.
8.3 Tovip design proposal

Design proposal ‘Tovip’ can be seen as the counterpart of Pivot (how creative); it holds the functions and interface design elements of which it was known that 1) implementing this element would conflict with the interface design of the PivotViewer platform and/or 2) which element implemented in both concepts would be better in general use.

The Tovip interface is characterized by a top bar with, where the research goal and constraints are grouped according to the category that they belong to. The tabs open when a user clicks on them and show all available options (Figure 8-1). All screens of the Tovip design proposal are available through appendix 8.2.

![Figure 8-1: The menu tabs of the Tovip concept](image-url)
8.3.1 The selection level

Criteria Panel:
By integrating Favourites in the criteria tabs, it becomes possible to perform a search within one or more sets of favourites. Functions for printing, sharing, obtaining a direct link and changing settings are available on the right. Clicking on the button with the number of methods being currently shown results in a drop-down menu with the last ten actions, so that a user can easily undo an action.

Different Visualizations:
Next to Grid visualization, a Table visualization was developed as a solution for the comparability issues. It can be activated when less than 10 methods are available and show the most important information of all method next to each other. Two other visualizations were introduced to provide a more research focused view based on the research of (Rohrer 2008) in the form of a graph and another one to support the execution methods after each other in a timeline as requested in the previous study. Both visualizations, which are presented in appendix 8.2, were not tested during the next study.
8.3.2 The information level

Trading Cards:
With the new design, the trading cards have been adjusted as well. The design was ‘professionalized’ and a visual for categorization and the four main constraints were added to the cards. The visual explains three important elements: the type of trading card (shape), the type of Research Goal (figure) and the Context of Product Use (colour; by Rohrer, 2008). In addition, a number of method-specific features are directly available when a user performs a mouse-over; playing the method video, opening the one-pager, adding or removing the method from favourites, viewing methods alike and viewing common follow-up methods. By clicking on a link, a pop-up overlay shows the information layer.

Header:
The top bar with the criteria is replaced by scrollable bar of all the remaining methods so that the user has quick access to them without switching to the selection level.

Information Overlay:
The information overlay starts with a one-pager. It gives the main criteria, advantages, disadvantages, resources, instructions and potential results for the method. The card is printable so that a user can make a personal tangible database. The menu of the information layer distinguishes the overview, authoritative details and user generated content.
9 Interface Design Test

The Interface Design Test intended to find out which of the design solutions that were implemented in the two concepts were the most appropriate. This test was also aimed at answering whether the Microsoft SilverLight PivotViewer platform could be used. This chapter outlines the research design, results and conclusions from this test.

9.1 Research Design

For this test, paper prototypes of the interfaces outlined in the previous chapter were discussed with six participants from various backgrounds:

- Two industrial design professionals
- One TU Delft IDE MSc graduation student
- One PhD within the DfU project
- One PhD outside the DfU project who develops a UX cardset and website
- One interface usability expert

After a short introduction to the project and the goal of the study, a case was given to the participants (Box on the right). The case described a situation and main criteria to find a method. The case required them to enter criteria, compare methods and obtain information about the method. It was possible to use all elements in the prototypes that were related to the selection procedure (criteria panel, view and sort, zoom in/out). When an unrelated function was selected, participants were asked what they expected to happen.

After task completion, the interfaces were discussed and compared, including the unused functionality. Participants were asked to give their preference for a design solution and to suggest an improvement.

Participants were requested to think out loud and it was stressed that not them, but the interfaces were subject of the test. The prototypes were switched between studies to avoid order bias. Depending on the location and participant, the 60-90 minute test was audio or video recorded (see also appendix 9.1).

A measurement company called ExoTect wants to improve their nuclear radiation handheld devices. ExoTect expects that they can sell many devices in the upcoming months, so pressure is on, but budget is larger than you are used to. You already gathered a lot of information about how users perceive nuclear radiation nowadays and developed some requirements and initial ideas. However, you want to involve users in the design phase of the project as well. You were given two weeks and a budget of 6000 euros to come up with a functional design.

9.2 Results

The following pages summarize the responses of the participants on the main screens of the interface designs.
9.2.1 Pivot Interface Responses – selection level

Criteria Panel (general):
- Too much options [r4.1, p. 1.4, 5]
- Has less options than Tovip [r4.1, p. 1.1]
- Great overview [r4.1, p. 2.5]
- Too much of a step-by-step approach [r4.1, p. 2.5]
- Feeling that I need to fill everything in [r4.1, p. 2.66]
- Icons are small [r4.1]

Research Goal:
- Is this a basic design cycle? [r4.1]
- Evaluate what: Design, use, experience? [r4.1]
- Difference between concepts and prototypes? [r4.1]

Top bar:
- Bar view not discovered by any participant
- Number of remaining methods not shown [r4.1]
- Expected settings: accessibility [r4.1], most used criteria [r4.1]
- A search bar is expected to search for a method directly (currently placed bottom left) [r4.1]

Basic Resources:
- Descriptions needed: what is remote? [r4.1], how much man-hours do I have? [r4.1]
- It is not about the budget, but about the price/performance index [r4.1]

More Resources:
- How to select quanti-/qualitative methods? [r4.1]
- Why the distinction? Too far away [r4.1]
- Experience should be more central [r4.1]
- Product size is irrelevant [r4.1]
- Number of participants is no selection criterion but a fact from the method details [r4.1]

Bar view:
- Methods are not distinguishable when they are that small [r4.1]
- Great function to select visually, but this also pushes the user in an order again [r4.1]
- Is it the higher the bars get, the more important it is? [r4.1]

Additional functionality:
- Sort on best match view wanted [r4.1]
- I want to manually add and delete methods [r4.1]
- I want to compare methods [r4.1]
9.2.2 Pivot Interface Responses – information level

Trading cards:
Cards are busy & not good to read (especially when they are smaller) (r4.1)
Inconsistent location of papers & post-its (r4.1)
Very clear that there is a description (post-it), I haven’t seen this at the other concept (although there is one) (r4.1)
Can I click on the post-its? (r4.1)
Not useful to display the image that big; use the space for displaying the information instead (r4.1)

Feedback Panel:
Nice to have this feedback; then I know I am at the right spot (r4.1)
Access to details is not clear enough; too small and expected at the bottom (r4.1)

Various: Too much change in the interface (r4.1) and too dark background (r4.1)

Tabs:
Not noticed as fast as the Tivop solution (r4.1) Expert Review is not helpful (yet) (r4.1)
Combine Instructions and Considerations (r4.1)
Give me an example of the complete study, including preparation and analysis (r4.1)

Content:
Calmer view than the Tovip information page (r4.1)
Information about the Appropriateness is great! Could be more up front, rather than the general description (which one already know from the card) (r4.1)
A lot of text (r4.1)

Top bar:
Back button is clear and used (r4.1), but for an overlay, a close button at the top right of the overlay is expected instead (r4.1)
9.2.3 Tovip Interface Responses – selection level

**General:**
- Icons are very nice (r4.1)
- Seems to be more interactive than Pivot (r4.1)
- Nobody recognized that the tabs were placed at the bottom. Suggestion: turn around (r4.1)
- I want to have a quick search and an advanced search option (r4.1)
- I do not have an overview of what I already entered (r4.1)

**Views:**
- They do not look like real buttons to me (r4.1)
- I love the best sort option! (r4.1)

**Research Goal:**
- Create was interpret as creating a study, not designs (r4.1)
- Multiple, not-matching combinations of goals were selected by most participants (r4.1)

**Basic & Advanced Study Criteria:**
- Are preparation & analysis time included in the Time Span? [r4.1] (yes, it is)
- Does Physical Presence mean the presence of the product that you are testing [r4.1] (No, yours)
- Equipment is irrelevant [r4.1]
- Is Location my location or the participant’s? [r4.1] (no, yours)

**Product Criteria:**
- Is Product Complexity the number of functions? [r4.1]
- Having an example of the size is handy [r4.1]

**About selecting values on scales:**
- Scales are preferred over buttons for setting the criteria as they communicate the range better [r4.1]

**Participant Criteria:**
- Number of participants is irrelevant; depends on the study you are going to perform. Only thing you can say is quantitative or qualitative [r4.1]
- What do I enter when my participants are domain experts? [r4.1]
9.2.4 Tovip Interface Responses – information level

**General:**
- Useful as a print-out (r4.1)
- You use this only with 4-5 methods (r4.1)
- Might not be visible on smaller screens (r4.1)

**Table Content:**
- Too much data / text (r4.1)
- All data is important to have (r4.1)
- Is there a sequence in importance of the information that is given? (r4.1)

**Keywords & Types:**
- Why are keywords so hidden? (r4.1)
- What is the difference between methods and techniques? How does that help me? (r4.1)
- Context of Product Use sounds helpful (r4.1)

**Top Bar:**
- Perceived as similar or recommended methods, while they are the other methods (r4.1)

**Menu and layout:**
- The menu items are clear (r4.1)
- Menu was perceived as not related to the content because of different mark-up (r4.1)
- Layout changes too much (r4.1)

**Info page Content:**
- Better overview than the Pivot information screen because of grouping (r4.1)
9.2.5 The thing with resources

Just as the former test about the selection procedure revealed some issues related to the interface, this test also revealed some issues with the selection procedure. This paragraph pays attention to one of the biggest problems that we faced during the development of the method selection tool; how to give budget (and other resources) a practical meaning to the user.

Remember that I told about the issue with budget, time and other resource-related criteria (page 53). Budget was found very important in the selection procedure (place 2, right after research goal), and participants stated that they needed a clear indication of the costs. However, it seemed impossible to give users exact figures (or a range of figures) about the necessary budget for a method. This was because of to a number of reasons:

1. **Level of detail (depth) of the method:** The more detail is required from the method, the more thorough the practitioner needs to be when preparing, executing and analysing the method. This, obviously, costs more money;

2. **Range (width) of the method:** Only when the method is exactly used according to its description, a statement can be made. When the method description is only used as a source of inspiration or when the method is adjusted to fit with the practitioners’ situation, it is very difficult to make a statement about the budget;

3. **Combination of methods:** methods and techniques are often combined;

4. **Experience of the practitioner:** generally, the more experience, the cheaper it is;

5. **Tariff** of the practitioner, company or other people involved, additional costs etc.

The very same issues were also found by the developers of the Methods Lab initiative. However, they “felt it was important to give some relative idea of the expense, degree of commitment etc. required for each method, as one point of the overall list was clearly to enable designers to compare methods in practical situations. [Therefore, they] got an informal panel of experts to rate each method knowing the full range of methods we had described (which itself is of course not complete)” (Aldersey-Williams 2011). It is for that reason that it was chosen to use the same five options for each criterion (Figure 9-1) for the current study.

![Figure 9-1: A page from The Methods Lab method collection with four bars that rank a method on experience, time, staff and budget respectively. See also appendix 5.3.](image)

However, users want to give meaning to the marks; “how much money is the first category?” (r2.1; r3.1; r4.1). Marks would always be an indication, based on the method being executed as described within the assumptions made for each of the five issues. With budget mostly being ‘low’ (r1.1; van Kuijk 2010; r1.3; r2.1; r3.1), or as low as possible, this could result in an overview of methods in which a highly potential method was excluded because it was marked as expensive. In addition, as we learned along the way, methods are rarely being executed according to their description, but the information is rather used as a basis or at least for inspiration (r2.1; r3.1). A high budget value could withhold the practitioner from looking at the method, while it still could be possible to use the method in a quick and dirty manner or as a source of inspiration.
Budget is the only resource with so many variables. For most (if not all) of the methods, we can give an indication about the needed timespan and staff. For instance, a questionnaire can be conducted over a longer period of time (thus offering statistical data), or as a ‘building block’ at an observational study to gain additional insights that can be used for inspiration in the design process. As you see; the timespan of a questionnaire says something about the level of depth that can be achieved, which is the case for most other methods as well. It is possible to make a statement about this for all methods.

More effort needs to be done for man-hours because this is related to the combination of staff, timespan and experience. With a timespan of one month and one single researcher, the maximum of man-hours would be 160. But if the practitioner is experienced, he would need less hours for the same job. You can imagine that, when the practitioner entered the timespan and his level of expertise, the system could calculate the range of man-hours when a method is being executed as described.

Still, the level of detail, range and possible combinations are into play; when a method is drastically tailored to the situation (in detail or scope), it remains impossible to make a clear statement about timespan, staff or man-hours. However, tailoring and combining methods is something that experts do more often, whereas novices tend to follow the description ‘by the book’ (r1.1 ; r2.1 ; r3.1). This is an important annotation that should be concluded in the final design at all resources. However, timespan, staff and man-hours are less prone to a wide range of variables than budget and can more easily be translated by the practitioner himself to his specific situation.

To conclude: the only thing we can give is an indication. It is impossible, even with an advanced calculation system, to anticipate on the variety of possible situations that appear in practice; each one is unique. Because budget largely depends on the man-hours – which in turn depends on implementation and experience - (r4.1), the practitioner should be possible to calculate the budget himself (which he, even with budget information available, might still do before he definitely decides which method to use).

We do not want people to value budget when we cannot objectify it. Man-hours can be calculated by the system, are a more realistic representation of the needs and the meaning of its values easier to imagine than budget. For budget people will mostly select a low value (the cheaper the better), whereas for man hours I believe that they are less attracted to do so. Therefore, I propose to deliberately exclude budget as a criterion. Annotations should make clear that by budget, we mean man-hours times tariff plus additional costs; thus explaining budget in terms of man-hours (Box 9-1). This will hopefully not draw users to the alley in which they search for the costs and will keep them in the avenue where all sorts of methods can be explored.

\[
\text{(Time Span/Experience)/Staff} = \text{Man-Hours if method is executed as described}
\]

\[
\text{Man-Hours} \times \text{tariff} + \text{Implementation variables} + \text{additional costs} = \text{Budget for the practitioners’ situation.}
\]

Box 9-1: Example function for calculating man-hours and budget when other criteria are known
9.2.6 Comparing methods

With the Table view of the Tovip concept, users were enabled to compare methods on their most important criteria. However, it seemed that this view lacked equality of the methods within the context that the user is in. When a user entered a low timespan for an evaluative study, the resulting methods might include questionnaire and heuristic evaluation. Heuristic evaluation is a method to invite experts to evaluate a concept or prototype of a user interface by a list of general guidelines. As we know, questionnaires can be executed with great detail with a lot of participants over a longer period of time or quick and dirty within a couple of days and with less than ten participants. The difference are numerous; quantitative data versus qualitative data, the ability to generalize the results versus the results being only usable for inspirational purposes and so on. Within the context of a low timespan, the first variant of questionnaires should not be visible. However, it is one single method that can be applied in many different ways. This means that all methods need to show the information that matches the criteria. Having no time? Then you cannot generalize or quantify your questionnaire results. Do not have direct access to users? Then the questionnaire should be an on-line variant, which could imply the need for a paid subscription at a website for surveys but takes potentially less time to analyse because all data are automatically included in an excel list. To go short; there is no one single way of doing it and therefore methods cannot be compared on a meta level, but only when the context of the user (determined by the user input) are taken into account as well.

9.3 Conclusions

This evaluative study intended to answer where the interfaces supported the selection procedure and where it didn’t. In general, the Pivot concept performed better because of the visual connection of the criteria panel and the trading cards. The categorization based on order of input in Pivot worked more efficient. It also performed better because users had a good overview of the values they could or have entered, while the tabs in Tovip were ignored at first. On the other hand, the icons, scale input bar and the explanations of the criteria values in Tovip were welcomed.

The selection procedure could be simplified by excluding equipment. By changing criteria Number of Participants and Participant Age Range in quantitative/qualitative and children/elderly, the uncertainty of the visualizations for these criteria will probably disappear, although there is a need for descriptions at each criterion, as already shown in paragraph 3.1.

The trading cards of Tovip were desired by all participants, with the adjustment that descriptions and the criteria values (which nobody saw) should be more visible. Many participants complained about the size of a zoomed-in trading card. The image was very big, while the information that one was looking for was almost ‘hidden’ on the right. They expected to see method information on top of the card instead.

Mixed responses were obtained for the visualization of the information levels; the overall design of the overlay in Tovip was preferred, combined with the presentation of the information of Pivot.

In addition, this study also intended to answer whether we should use the PivotViewer platform or not. This question is addressed in chapter 11, after the final design is being discussed in the next chapter, chapter 10.
10 **Recommended Design**

This project intended to: 1) develop a selection procedure for selecting a method in product development practice and 2) to design an interface that supports this procedure. This chapter explains the selection procedure that I recommend based on the results of the previously presented studies and design phases. Next, the interface design is explained by two levels for method selection and information gathering.

### 10.1 The selection procedure

The selection procedure is primarily based on a set of criteria that are mostly known to the practitioner, not hard to find out or at least have an important influence upon the selection. The criteria are listed in this logical sequence in the interface.

Next to a criteria based search, methods can also be searched in a visual manner or by applying a keyword filter upon the selection. In addition, method information is presented gradually as the amount of methods decreases. By providing various ways to find methods and offering method information to be presented to the user bit by bit, the user will be encouraged to adjust his input (‘play with it’) and read chunks of information of various methods. Explorative components are added to the analytical procedure of criteria-based search.

The process flow chart of Figure 10-1 shows the interaction possibilities that a user has during each step in the selection process.

This chapter further discusses the interfaces of the Pivot+ design, of which all the screenshots are available through appendix 10.1, together with some experimental functions (colour coding and method combinations).
Start

Criteria
- Enter product type and research goal
- Enter resources and other criteria

Visual
- Select view type
- Select sort type

Keyword
- Enter keyword value
- Press <enter>

Do I see interesting methods?
- Yes
- No
  - Yes, but still too many to choose
  - No

Click on a method

Read basic information
- No
  - Do I want to know more about this method?
    - Yes
      - Open method details
      - Read detailed information
    - No
      - Do I want to execute this method?
        - Yes
          - Read & download information for execution
          - Done!
        - No
  - Do I want to execute this method?
    - No
    - Yes

Figure 10.1: Process Flow Chart of the recommended design
10.1.1 The selection criteria and their values
As a result of the criteria list used in the previous study, the detailed list of criteria below was developed. The list is categorized in a sequence that matches the practitioner's knowledge about the project; as he (almost) always knows what he is working on and what he wants to achieve, he can enter his product type and research goal first. The common next step is to apply the limiting factors and available resources to the remaining methods in order to decrease the set of methods even more. As a last step, additional criteria can be entered. This paragraph explains all criteria by an icon (of which most are a courtesy of NounProject 2011) explanation, type, default input handling and the values which a user can choose from.

**Product Type**
*What is the type of product that you want to study?*

**Interface**
e.g. an application, website or cloud computing interface
Type: single choice
Standard input handling: AND

**Product**
e.g. a computer mouse, lamp, radio, trolley or furniture
Type: single choice
Standard input handling: AND

**Environment**
e.g. a train interior, station, park, office or signage
Type: single choice
Standard input handling: AND

**Research Goal**
*What do you want to achieve with this study?*

**Discover**
*Gaining information*
Type: multiple choice (list)
Values: ..user characteristics
..user needs
..context of use
..current product use
Standard input handling: AND

**Create**
*Developing solutions*
Type: multiple choice (list)
Values: ..workflow or procedure
..specifications
..concepts
Standard input handling: AND

**Evaluate**
*Performing a usability check*
Type: multiple choice (list)
Values: ..concepts
..a working prototype
Standard input handling: AND
### Resources
What are the limiting factors for this study?

### Access to Users
Whether or not you can involve users in the study
- **Type:** scale
- **Values:**
  - yes, involve
  - no access to users
  - only remotely
- **Standard input handling:** AND

### Man Hours
The total amount of hours that the team can work on the study
- **Type:** scale
- **Values:** 20, 40, 80, 160, 320 hrs
- **Standard input handling:** OR

### Staff
The number of people that can work on the study
- **Type:** scale
- **Values:** 1, 2, 3, 4, 5+ persons
- **Standard input handling:** OR

### Time Span
The total time, including preparation and analysis
- **Type:** scale
- **Values:** day, week, month, 6 months, year+
- **Standard input handling:** OR

### Experience
The knowledge and experience that the team has in testing
- **Type:** multiple choice (list)
- **Values:** values presented is the combined list of values of the methods that are still available
- **Standard input handling:** OR

### Additional Criteria
Are there additional requirements or wishes for this study?

### Study type
The different types of and the use of products within studies
- **Type:** multiple choice
- **Values:** quantitative/qualitative, product use contexts
- **Standard input handling:** OR

### Participant characteristics
Specific characteristics of the participants that you know about
- **Type:** multiple choice
- **Values:** children/elderly, various disabilities
- **Standard input handling:** AND

### Possible locations
The possible locations for you (not the participant)
- **Type:** multiple choice
- **Values:** from my desktop, in the field, in a lab
- **Standard input handling:** OR
10.2 The selection level

**Criteria Panel (general):**
The criteria panel includes all criteria presented on the previous pages. Clicking on a criteria-group (e.g. Product Type) will result this group to open and its criteria with values being displayed. On start-up, the Research Goal group, as presented below, is opened to invite the user to start entering this subject first.

A keyword filter was placed on top (instead of on the right of the top bar, as suggested by participants) because it works as a filter in addition to the criteria. Multiple keywords can be entered and an overview of the keywords can be displayed. All criteria can be removed by clicking on the top right “clear all” link. Before actual deletion of the values, the user is prompted with a confirmation screen for this action. The criteria bar can be minimized to make more room for the trading cards.

**Criteria Panel (accessibility of the criteria):**
It was proposed by some participants of the last study to disable some criteria before the most basics (e.g. research goal and product type) were not inserted. This would decrease the chance that users would insert wrong criteria, which could result in a set of inappropriate methods for the users’ situation. However, it has been decided to keep all criteria available at all times because of two reasons. The first one finds its origin in the second study, where users claimed that a step-by-step approach as implemented in the Wizard concept could result in users being taken too much ‘at hand’, thus losing their faith in the system because there is no freedom. Secondly, closing sets of criteria would mean that, for instance, the user could not look for methods that require at least 160 man hours because the time span and staff are not yet inserted (see page 70 for more about this relation). This would exclude a wide variety of explorative and research based activities that could be of value to, for instance, university research programmes, but also for product development practice. To support users in making a correct choice, explanations are available for all criteria and criteria values.
Closed Criteria Groups:
Closed groups show a description of the group when there are no values selected yet. When there are values selected (as with Research Goal) the group shows an overview of the selected values. This provides the user with an even better overview of what he has inserted.

Open Criteria Groups:
Open criteria groups show all the options available within that group with an explanation of the criteria alongside it.

Trading Cards:
Trading cards are available because of the entered criteria or when the user zooms in, the trading cards spread over the available space so that the screen is always filled. Simultaneously, the cards visual adjusts to provide the user with additional information about a method when the size of the cards increases. See also the following screenshots and page 81 to find out more about this function.

And/or button:
The “and/or”-button enables users to find a method that applies to all values of a criterion or only one. For instance; conducting a study for a kitchen could involve both the users’ movement between the various elements (testing the environment) and the users’ handling with a gas hub or an oven (testing products). In such a situation one might look for a method that could be used to test both the environment and the products simultaneously and a search result with methods that can be used for either one of them is not of help to the practitioner.
Input Types:
There are various ways in which a value can be inserted; single choice (at the Product Type group), a list (at e.g. Access to users) and scale (at e.g. Time Span). All criteria are handled the same by the system (that checks if one value is (or) if all values (and) are present for the method), but scaled criteria have a sequential representation of the values through a blue bar. The bar contains identifications of the values below and lines between them.

When a user adjusts the value, the area outside the range and its identification turn light grey, as visualized at Man Hours.

It is possible that previously entered criteria results in the elimination of all methods that are available for another value. When this happens, a dark grey patterned part of the scale appears (as visualized at Man Hours and Time Span). Hovering over this part with the mouse activates a mouse-over explaining what has happened.

Add a personal method:
A special card at the bottom right enables the user to add a personal trading card about a method. Although no follow-up screen is present, this function should result in the option to value all criteria for this method, add an image and texts. Some parts of the personal method need to be mandatory, others are optional. Personal methods can be based on another method within the system. Personal methods are marked with a logo and are automatically placed in a favourite group in the top bar.

Access to the Method Value Panel:
When a trading card is selected (by clicking on it), a small icon at the top right of the screen can be clicked to obtain all criteria values for that method. Clicking it results in the panel on the next page being visible, as also available by zooming on a trading card or double-clicking on it.
Each value has an explanation:
As incorrect interpretation of the values can be highly influencing the set of available methods (as especially seen in the fourth study), explanations for each value is presented via a mouse-over. By giving this explanation I hope that users will be more aware of the meaning of their resources and criteria when they are searching for a method.

Method Value Panel:
This panel shows all values of the method for each criterion (not only the values that were entered because that can be seen by the user on the left). The panel is usually closed and accessible by the information button on the previous page. This was done deliberately because this information is usually not very helpful in the selection procedure, but it is a nice reference and confirmation. From this screen, the user can access the information page by clicking on "view the details"; which is also available via a link on the trading card (see next page).

Top bar (four blocks on the left and center):
The top bar shows a number of general functions that are applicable during every step of interaction. Actions can be undone/redone (undone also shows a history in a drop-down) at any time; the backspace key on the keyboard should result in the same effect.

Favourites can be selected individually or by group. Favourites are made through a personal method card or via the button "add to favourite" on the trading card (next page). When a user selects a group of favourites with one or more criteria already filled in, he will be asked to either apply the criteria to the selected favourites or to delete all criteria and show all favourite methods.

Next to the Grid view, the Bar and Table views are available, which we already saw at 59 and 62 respectively. Trading cards can be sorted according to all items in the criteria panel (except the Keyword Filter). We might consider adding a "best match" sort type to this list; which I discussed on page 62.
The trading cards are cleaned of unnecessary and distracting information that was present in the previous versions. The design is developed as a deep zoom image which shows additional information about the method when you zoom in. The information is shown at different sizes to maintain readability when the user zooms in or out. It was chosen to show the following information in sequence: a short description (what), when the method is of good use, possible outcomes and advantages/disadvantages. This sequence is a result from the third and fourth study; where it became apparent that when users are eliminating methods, they want to know more information about the remaining methods of the same time.

Hovering over a method adds a blue line around the card that presents a set of links for quick access to common follow up information and actions.
10.4 The information level

Top Bar (six links on the right):
The system can give Notifications when new methods are added or when methods are adjusted since the last visit. In addition, tips for use and the announcement of new functions can be placed here. The Settings link opens a drop-down menu where the user can adjust his profile and customize the start-up settings of the tool. An example of this is to make a pre-set of the criteria so that he does not have to select interface every time, while he is only developing interfaces. It could also be possible to automatically open with a set of favourite cards instead of all methods being displayed. The Print, Share and Link functions offer the user to print the current overview of methods and criteria, share this exact visual via e-mail or social media and to acquire a direct url (link) to the current visual. This is much like similar functions implemented in Google Maps.

General:
The information page is accessed by clicking on the trading card or the button in the Method Value Panel. It appears as an overlay on top of the selection level to maintain the ‘connection’ with this screen. The screen dump below distinguishes three information types: Overview, Details and Community. The Overview presents the user with an Introduction or Criteria Values that were also available to him in the selection level.

Details:
A featured video of approximately five minutes explains the method and shows an example of how the method could be executed in practice together with its results. Case Studies give a literary description of the method being prepared, executed and analyzed.

Community:
The information in the tool will be co-developed with a (yet to establish) community of usability professionals worldwide. This part of the information page gives access to the reviews and videos added by this community. In addition, the development link brings the user to a section where adjustments to this method and derivatives of this method are being discussed.
11 Conclusion, Discussion and Recommendations

By extensive user involvement in every phase of the design process, it was possible to develop a selection procedure and interface design with great potential. This final chapter therefore outlines the conclusions, discussions and recommendations for further development.

11.1 Conclusion

I deliberately use the word ‘potential’ in the introduction because the design is far from finished. It wasn’t for no reason that it was said at the beginning that this graduation project was in fact a PhD project. The idea of developing a method selection tool is a multi-year process; as Nigel Bevan of the Usability Body of Knowledge and UsabilityNet initiatives can confirm (Bevan 2009a).

Another reason for using the word ‘potential’ in the introduction can be found within the great enthusiasm of the participants and on-line community. It was mentioned several times by participants and professionals at companies and other initiatives worldwide that the method selection tool as developed in this project would be very helpful in product design processes. With the involvement of actual users from a wide range of backgrounds throughout the process, awareness has been created about the need for proper method selection and the tool as a decision support system. As a result, many potential users are looking forward using the tool and willing to give their input during further development.

The main goal of this project was to deliver a selection procedure and an interface design to support this procedure; not to deliver a working application that could directly be used by practitioners. The results of this project include both, which match with the most important requirements (Table 11-1) and most of the other requirements (page 98). By adding recommendations for design and further development, it can be said that this project is a success.

I am very curious how things will be in one year, or two, because the true success of the method selection tool does not depend on the result of this project, but on what happens next.
Table 11-1: Requirement check table for the current build of Dumes

<table>
<thead>
<tr>
<th>Selection Level – inserting criteria</th>
<th>checkmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A selection procedure is provided which is primarily based on criteria about the research goal and product type, followed by resources and other criteria</td>
<td>😊</td>
</tr>
<tr>
<td>Implemented in the criteria panel</td>
<td></td>
</tr>
<tr>
<td>2. Selection based on necessary resources (budget, time) is not a primary mechanism (This might result that only the cheapest and least time consuming methods will be used in practice, potentially leaving the most beneficial methods aside)</td>
<td>😊</td>
</tr>
<tr>
<td>Budget is replaced by Man Hours</td>
<td></td>
</tr>
<tr>
<td>3. Entering criteria is done without doubt between two or more options because only then a confident decision can be made</td>
<td>😊</td>
</tr>
<tr>
<td>Descriptions are given for all criteria and their values to support this</td>
<td></td>
</tr>
<tr>
<td>4. When a criteria value cannot be entered because another criteria overrules the value, this must be communicated to the user (instead of not showing the value at all)</td>
<td>😊</td>
</tr>
<tr>
<td>A use cue and a description of the issue are provided</td>
<td></td>
</tr>
<tr>
<td>5. Users can directly search for a method by the methods’ name</td>
<td>😊</td>
</tr>
<tr>
<td>Various ways of searching are provided</td>
<td></td>
</tr>
<tr>
<td>6. The tool supports multiple types of categorization (e.g. research goals, constraints, wishes)</td>
<td>😊</td>
</tr>
<tr>
<td>Various ways of sorting the trading cards are provided</td>
<td></td>
</tr>
<tr>
<td>7. The effect of changing criteria/categorization is made visible instantly</td>
<td>😊</td>
</tr>
<tr>
<td>Similar to the PivotViewer platform</td>
<td></td>
</tr>
<tr>
<td>8. The tool gives multiple options/recommendations so that they can be discussed</td>
<td>😊</td>
</tr>
<tr>
<td>The user decides himself when to stop entering criteria values: he is in control</td>
<td></td>
</tr>
<tr>
<td>9. The tool can be used by different roles and levels of expertise (novice-expert) in product development</td>
<td>😊</td>
</tr>
<tr>
<td>Probably yes, but has not been tested (needs a working prototype)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Information Level</th>
<th>checkmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Information is given consistently, according to a strict framework</td>
<td>😊</td>
</tr>
<tr>
<td>Information is given by three categories representing authoritative, collaborative, and community content</td>
<td></td>
</tr>
<tr>
<td>11. Information is given gradually, showing the purpose and the required resources for a method first</td>
<td>😊</td>
</tr>
<tr>
<td>Provided in the selection level with dynamic deep zoom images</td>
<td></td>
</tr>
<tr>
<td>12. The product gives information about the execution of the method in such a manner that the user can execute the method appropriately</td>
<td>😊</td>
</tr>
<tr>
<td>Provided via a step-by-step guide in the Instructions page</td>
<td></td>
</tr>
<tr>
<td>13. Method information shows the expected level of results and “how effectively it introduces usability improvements into the product”</td>
<td>😊</td>
</tr>
<tr>
<td>Too much variables to explain this. Instead, I chose to explain when a method is appropriate to use and to include examples of the method being used from preparation to analysis</td>
<td></td>
</tr>
<tr>
<td>14. Users are able to use the information of the tool to develop their own methods or to customize or combine existing methods.</td>
<td>😊</td>
</tr>
<tr>
<td>Personal methods can be added to the system that can include texts and values of other, existing, methods. In addition, each method has a section for personal notes. However, these use of these functions were not tested</td>
<td></td>
</tr>
<tr>
<td>15. Method information is being adjusted by involving practitioners in an inspiring and stimulating way</td>
<td>😊</td>
</tr>
<tr>
<td>Via a (yet to establish) community</td>
<td></td>
</tr>
</tbody>
</table>

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11.2 Discussion
This paragraph discusses the testing procedures and used information sources of this project.

11.2.1 Testing procedures
Almost all participants in the studies were Dutch. It might therefore be a possibility that the design has been tailored to the Dutch market instead of an international market. Differences could be found in colour and shape preferences, but also in interaction paradigms and information expectations. I recommend conducting an international study when a working prototype is developed.

Input was generated via interviews, workshops and paper prototyping sessions about what users said and did in a lab setting. No information has been gathered about actual use in practice since none of the tests took into account the use of the tool over a longer period of time during a product development project.

In addition, the evaluation test included only twelve methods (out of approximately 200 available methods). Although the selected twelve methods are both spread among all project phases and research goals as well as deep within the design goal (page 49), it is not realistic to completely rely on the current results of testing when there are much more possible outcomes that need to be taken into account.

11.2.2 Used sources for method information
During this graduation project, the information about methods was derived from a number of method collections. Appendix 7.4 shows a detailed overview of the sources that were used for the criteria values and this paragraph discusses the used sources for the information pages. The collections were chosen based on their background, completeness, clarity of language and popularity within the field.

As developed by worldwide professionals in an iterative manner and with the Usability Professionals’ Association (UPA) as an initiator, the Usability Body of Knowledge (UBoK) was seen as the primary source. Second, collection Usability.net was chosen since it was initiated by the European Union in collaboration with professionals such as Nigel Bevan. Thirdly, the user centred design methodology wiki of the Kaist was consulted when none of the former sources did provide the necessary information such as examples and images. In addition, the Methods Lab booklet was chosen as a reference for the budget, time, staff and experience criteria; as it holds a five-point scale of these four criteria.

Without having an authority in usability and without decades of experience and knowledge about the use of all sorts of methods, only little information was developed by me. These pieces of information were based on the information given by literature or the method collections or based on my own experience and knowledge. The last type needs special attention later in the project when a community is established that can professionally evaluate, adjust and expand the information. Since validation of the information is a very time consuming task, it was not considered to be part of this graduation project.

For method information, PhD Christelle Harkema of the DiU project developed a list with short descriptions of various methods (appendix 11.1). This list could be expanded with knowledge and could serve as a basis for the method information database.
11.3 Recommendations

This larger section of this chapter outlines all recommendations regarding the design of the tool in general, future development and for the DfU project.

11.3.1 Design

This paragraph sums up a variety of functions that are either included in the final design but not yet tested or not included because the function was out of the scope of this project, but are worth investigating. I recommend to at least studying the list of functions and the first subparagraph when a working prototype has been established.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Adding a personal method: procedure, possibilities, interface (page 79);</td>
<td>2. Working with favourites: location of the favourites, individual and grouped favourites, applying filters to the favourites (page 80);</td>
</tr>
<tr>
<td>3. Table visualization: content, presentation (page 62);</td>
<td>4. Community including development platform: connection with the tool, stimulate contribution, how contributions will be rewarded (page 82).</td>
</tr>
</tbody>
</table>

11.3.1.1 Content Management System

Next to a long list of wishes from a user experience point of view, there are some technicalities as well. The most important technical issues at this time are maintenance and caching. For testing purposes, a datasheet was created using Microsoft Excel, but updating this datasheet is very time consuming. In addition, it takes a sufficient amount of time (up to a day at worst) for the Silverlight application to process the new datasheet; especially with new images. In the meantime, data is not reliable and the deep-zoom images look funny. By introducing a content management system (CMS), this problem might disappear. It is highly recommended to directly start developing with a CMS.
11.3.1.2 Not only methods

Since this project was started aimed solely at ‘method selection’, it sounds logical that only methods would be part of the final design. There has been discussion about how to handle terminology such as methods, tools, techniques and methodology (page 11). Which item belongs to which category and how do we communicate that to the user? However, a distinction does not seem to help the practitioner further because he is solely interested in solving a problem. From that perspective, using a tool over a method in pursuing his research goal doesn’t matter. It was therefore decided not to make such a distinction, but to advice in possible combinations and similar methods instead.

This means that the focus in further development could shift from being methods-only to goal-oriented; displaying all sorts of practical information that could help practitioners to reach usability related goals such as finding user needs, creating concepts and evaluate the usability of a working prototype. Next to methods, guidelines, tools and other useful sources could be present in the system. An example of this is already implemented in the recommended interface design on page 79; Interface Design Patterns. This trading card (Figure 11-1) leads to a web page that holds various solutions for common interface design problems. Using these so called patterns could help the practitioner when designing an interface that includes commonalities such as contact forms, pricing tables and product representation pages. Using these patterns could reduce the need for involving users in the creation of such an element, thereby reducing the development costs (note that this never does decrease the need of evaluating the design!).

This, however, could result in 1) referring to incorrect sources and 2) a lack of focus for what the tool exactly does. In order to tackle the first argument, there must be a board of examiners that reviews new and adjusted information before they are made public; as a regulated wiki. For the second argument I propose to change the name from “method selection tool” to “ucd resource supporter”, as we offer support to the practitioner throughout the entire ucd development process by offering various resources.

11.3.1.3 Other Criteria

The list of criteria is a good start that includes common products, goals, constraints or resources that came from my studies. However, that list might still be incomplete. For instance; where does the gesture-based interaction principle of a Wii, Xbox360 or Playstation Move belong? Because there is no complete database yet with criteria values for each method (instead, there is a set of methods that were selected for testing purposes), it is hard to determine which criteria could be of value. The list of criteria should therefore be re-evaluated when a complete database of methods is being developed.
11.3.2 Future development

11.3.2.1 Using Microsoft Silverlight PivotViewer, or not?

With the Microsoft Silverlight PivotViewer platform, it was very easy to develop a prototype that visualizes the selection procedure for the third study. User input has shown that a lot of functions and interface design elements should be changed to make the platform to support the selection procedure, but would these in the final design changes be possible?

To answer this question I discussed the list of functions with design agency Sparked, who have experience in the development of PivotViewer applications in collaboration with Microsoft. The answers to this list are presented in Table 11-2. In addition, Table 11-3 shows advantages and disadvantages of using PivotViewer or going for a tailor made solution.

Table 11-2: Overview of the functions implemented in the recommended design that are not available in the current standard version of PivotViewer, including comments from an industry about the (future) possibility of it

<table>
<thead>
<tr>
<th>Function Description</th>
<th>Priority</th>
<th>Comment of Sparked or Microsoft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grouped interface controls</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Changes location of interface controls</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>Undo and Redo buttons with history</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>Favourites and groups of favourites</td>
<td>Medium</td>
<td>Y/N</td>
</tr>
<tr>
<td>Table View</td>
<td>Low</td>
<td>Y/N</td>
</tr>
<tr>
<td>Notifications and Help screens</td>
<td>Low</td>
<td>Y</td>
</tr>
<tr>
<td>Settings functionality (auto-fill of criteria bar and to show/hide interface elements)</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Print, Share, Link functionality</td>
<td>Low</td>
<td>Y</td>
</tr>
<tr>
<td>Aesthetics (colour and size)</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Scale input type with annotations and visualization of 'out of range' values</td>
<td>High</td>
<td>N</td>
</tr>
<tr>
<td>Icons and descriptions at the criteria</td>
<td>High</td>
<td>N</td>
</tr>
<tr>
<td>Handle multiple criteria values by ‘and/or’</td>
<td>Medium</td>
<td>?</td>
</tr>
<tr>
<td>Categorization of the criteria</td>
<td>Medium</td>
<td>N</td>
</tr>
<tr>
<td>Mouse-over descriptions for criteria values</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>Aesthetics (colour and size)</td>
<td>Low</td>
<td>Y</td>
</tr>
<tr>
<td>Possibility to add a personal method</td>
<td>Low</td>
<td>Y</td>
</tr>
<tr>
<td>Deep Zoom images</td>
<td>High</td>
<td>Y</td>
</tr>
<tr>
<td>Multiple links added to the trading cards</td>
<td>Medium</td>
<td>Y</td>
</tr>
<tr>
<td>Criteria Value panel as shown</td>
<td>Medium</td>
<td>Y</td>
</tr>
<tr>
<td>Overlay of the information page</td>
<td>High</td>
<td>Y</td>
</tr>
</tbody>
</table>
Table 11-3: Overview of the positive and negative aspects for developing the method selection tool based on the PivotViewer platform or by a tailor-made solution

<table>
<thead>
<tr>
<th>Positive using the PivotViewer Platform</th>
<th>A Tailor Made Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Relatively inexpensive</td>
<td>- Interface can completely support the selection procedure</td>
</tr>
<tr>
<td>- Relatively short development time</td>
<td>o Algorithm for ‘grey area’</td>
</tr>
<tr>
<td></td>
<td>o Rating for ‘Best Match’</td>
</tr>
<tr>
<td></td>
<td>- Platform independent (when using html 5, ajax)</td>
</tr>
<tr>
<td></td>
<td>- We own the source code and have complete control over development</td>
</tr>
<tr>
<td></td>
<td>- Potential better integration with social media, community and development platform</td>
</tr>
<tr>
<td>Negative</td>
<td>- Relatively expensive</td>
</tr>
<tr>
<td></td>
<td>- Relative long development time</td>
</tr>
<tr>
<td>- The interface does not completely support the selection procedure</td>
<td>- No tablet support (No Ipads – Android and Windows tablets are supported in the near future REF, although maintenance of the interaction principles are unknown)</td>
</tr>
<tr>
<td>o Platform dependent:</td>
<td>- No control over development of the source code</td>
</tr>
<tr>
<td>o Computers (and other types of media) need Silverlight plugin installed.</td>
<td>- Implementing future versions of the platform with maintenance of tailor-made implementations can be costly and time consuming</td>
</tr>
</tbody>
</table>

Looking at Table 11-2 with more detail, we notice that the most ‘No’s’ are given to the parts of the interface with the highest priority: that of the criteria panel. When future additions are made, it is most likely that they will influence the selection procedure and, therefore, the criteria panel. With this part being non editable, the PivotViewer platform becomes less favourable.

From both tables, it is my recommendation to not develop the tool in PivotViewer unless solutions are found for the ‘missing’ functions in Table 11-2. This recommendation is based on the functional needs for the interface to be completely supportive to the selection procedure. As always, budget is a powerful drive within projects and, as I appear to know, there is no budget for a tailor made solution in this project. However, I stress again the importance of the functionality for users to reach their goals and that the PivotViewer platform could not ever, in its current form, be supporting this.

A tailor made solution on the other hand would take a long time to develop; a time in which we cannot offer practitioners a selection tool and a database of methods and a time in which we cannot test functionality. It is therefore imaginable to start development of the database and the tailor made solution while, if possible, PivotViewer is adjusted to meet the most important functionality so that it could be used for testing purposes and to give practitioners already something that they could use.
Important to add is that values in the PivotViewer platform should either contain a “yes” or a “no” in the database and cannot contain an “under conditions”. This is important because my studies (2.1) show that method values can have the ‘grey areas’ in which a method is not recommended, but still possible under certain conditions (Figure 11-2). For example, conducting a questionnaire within a week might be possible, but without quantification or generalization of the data. It might also not give the results that are in line with your goals.

This implicates that criteria are linked with each other and that method values can vary as a result.

11.3.2.2 Research

During the development, a number of additional studies need to be carried out. The list below outlines the type and timing of recommended studies until the launch of a public beta in order of appearance:

1. **International information validation**: No information has been validated yet as this project focussed on the development of a selection procedure and its accompanying interface. This is of high priority before the tool will go public, as people will rely on the data. An international study can eliminate cultural differences, considerations and perceptions on methods.

2. **Procedure test with all methods**: This project did include a procedure test that included a small set of methods (12). This test was not meant to be a derivative of reality, but a reality-check should be executed during beta-time to ensure that the correct methods are being displayed at all times;

3. **Longitudinal project test**: This project did not include a longitudinal test because that would be too time-consuming without having a working prototype. I recommend conducting such a test with a working prototype to get information about realistic product use that evolves over time. The method could answer questions related to how people handle favourites, adding methods, settings and the community;

4. **Use an interactive comment board to collect user input worldwide**: Once established, it is easy to collect information and involve users from time to time. Include a reward system to maintain the attention of the community. A LinkedIn group for this purpose has already been opened at bit.ly/DfUexploregroup;

5. **Build in anonymous user stats to improve the procedure and interface**: Once a beta is available for public use, include this to create statistical arguments for improvements.

![Figure 11-2: Overview of input values and method values with a 'core' and an 'edge'](image)

Including such an algorithm would significantly increase the complexity of both the system and the mental model of users, while the necessity for it has not been determined. A procedure test with all methods (see next paragraph) is needed to answer this question.
11.3.3 Collaboration

During this graduation project, several international collaboration opportunities arose. It was decided not to collaborate with any of the initiatives during graduation as this might alter the focus from research and design to contact management and setting up these future collaborations. However, as the Design for Usability projects ends by December 2011 and without budget for the development of the tool and for continuation of other deliverables of the project by the end of this year, finding a partner is almost necessary. This paragraph outlines some of those partners.

11.3.3.1 Usability Body of Knowledge and UsabilityPlanner

As mentioned in the first chapter, the Usability Professionals’ Association (UPA) is developing an authoritative source for usability information; the Usability Body of Knowledge (UBoK). The website already contains a lot of data about methods and a lot of other usability related information. The board of the UBoK set information quality high on the agenda as they are also working with international volunteers to expand the information on the website.

The UsabilityPlanner (UP) provides a selection procedure based on a set of questions and criteria somewhat similar to what this project intended to achieve. The UP is still in beta and there are plans to include the UP in the UBoK methods section. However, my studies and the responses from practitioners that I got show that such a selection procedure is too cumbersome and does not fit with the creative mind of designers. In this light, the UP can also be seen as a competitor.

The initiatives are co-developed by Nigel Bevan. Bevan has already been contacted in the early stages of the project and there are three scenarios for collaboration in which he approved that we could use the UBoK data in our tool with referring to the original source. (Bevan 2010a) Collaborating with the UPA’s UBoK also has advantages of an international network of 2,400 members, a magazine (UX), World Usability Day events and the organization of one of the largest international conferences on usability.

For future collaboration it might be wise to develop the method selection tool in Drupal CMS, to make it fit with the UBoK in a technical manner (Battle 2010). Over time, the UBoK should also be able to “incorporate content from outside organizations, as well as share content with those organizations that improves overall visibility.” (Battle 2010).

11.3.3.2 Chi-NL

Similar to the UPA is the Association for Computing Machinery (ACM) Special Interest Group on Computer Human Interaction (SIGCHI). The association publishes a magazine (Interactions) and organizes conferences. Unlike the UPA, this association has a Dutch chapter: Chi-NL. After my workshop at the Chi-Sparks conference, the chairman invited me and the DfU board to “talk about how to evolve the subject of usability in the Netherlands into a more business-oriented perspective” (Leer 2011). It is imaginable that collaboration could start from this. Such collaboration would probably be easier to manage than with an international partner. However, going international is easy with the ACM being higher in the hierarchy.
11.3.3.3 Three other initiatives

Another collaboration opportunity came from the Artesis Hogeschool Antwerpen, Belgium, where a team is working on a ‘User Centred Design Roadmap’ which has been completed recently. The goal of the project was to ‘lead’ SME’s through the world of user centered design (de Keersmaecker 2011), therefore SME’s like Namahn and Verhaert were involved. As the DfU project primarily focussed on larger companies by involving Philips, Unilever and Océ in our project, it is imaginable that we serve the practitioner with other types of information. In order to expand and to be fully aware of the possible blank spots in our project, it is at least worth looking into the results of Artesis.

A similar initiative to the DfU project is being carried out in Germany and Denmark as the “User-Driven Innovation project”. The goal of this EU funded project is to promote usability at companies. The project is currently being carried out with Nicole Busch as contact person. Collaboration has not been explored, but it is imaginable that the DfU could continue on European basis by joining this project.

Another initiative comes from Brazil, where a project group of the Faber-Ludens institute of Interaction Design developed a framework to exchange and create knowledge on line; Corais.org. Together with this website, a UX card-set was developed that has a number of unique functions that insinuates a cross-over between the physical and the digital world (appendix 11.2):

- The UX Cards are divided in three categories: methods, deliverables and supplements;
- Cards can be connected to each other (top is input, bottom is output);
- A QR code leads to an information page on the website;
- The cards are made of PVC material, so that people can write and easily erase text with a whiteboard marker;
- There are blank cards so that people can add methods, deliverables and supplements.

All of the above mentioned contacts are informed about the finalization of the graduation project, the upcoming steps and invited to comment on a possible collaboration.
12 References

This chapter outlines all the references that were used in this thesis. The references are divided in a number of sections, according to the nature of the source. This chapter also lists all method collections that are (in my knowledge) of practical value in product development processes and acknowledgements.

12.1 Books & articles

9. Dreyfus, H. L. (2003). Can there be a better source of meaning than everyday practices?


### 12.2 Websites & on-line material


12.3 Personal communication

49. Aldersey-Williams, H. (2011, July 13). E-mail message Re: the methods lab. See appendix 12.1
52. de Keersmaecker, A. (2011, ) E-mail message: RE: criteria for selecting methods in user-centred design. See appendix 12.4

12.4 Performed studies

r1.1. (2010). Open interviews with the industrial partners of the project: Weevers, T.
r1.3. (2011). Workshop with PhD Christelle Harkema on January 13 with the industrial partners: Weevers, T.
r1.2. (2010). Open interviews with the team members of the project: Weevers, T.
r2.1. (2011). Paper prototyping sessions with all industrial partners of the project to test the concepts: Weevers, T.
r3.1. (2011). Workshop at the Chi-Sparks conference to test the selection procedure: Weevers, T.
r4.1. (2011). Paper prototyping sessions with all industrial partners of the project to test the interface designs:

12.5 Method collections

A lot of method collections are available to the practitioner. This paragraph lists all these collections with a link to their source. Images and a short description of the most practical collections are available via the method collection cardset in appendix 3.5 or via http://dfu.tristanweevers.com. An extensive table with details on e.g. content, presentation and target group per collection is available through appendix 3.1.

- Usability Body of Knowledge: www.usabilitybok.org
- UsabilityPlanner: www.usabilityplanner.org
- UsabilityNet: www.usabilitynet.org
- Usability.gov: www.usability.gov
- Kaist UCD Methods: http://dpl.kaist.ac.kr/design-methodology/Main_Page
- Ideo method cards: http://www.ideo.com/work/method-cards
- Inclusive Design toolkit: http://www.inclusivedesigntoolkit.com/
- Ideo Human Centered design toolkit: http://ideo.com/work/human-centered-design-toolkit
- Selecting a remote research method: http://www.flickr.com/photos/clearleft/4931570875
- Mental Notes card set: http://www.getmentalnotes.com/
- Design with Intent card set: http://www.danlockton.co.uk/dwi
- Creative Whack Pack card set: http://www.danlockton.co.uk/dwi
- UX Trading Cards: http://nform.com/tradingcards
12.6 Design criteria

This paragraph lists all design criteria for the method selection tool according to the research question that they address.

Selection procedure:

1. A selection procedure is provided which is primarily based on criteria about the research goal and product type, followed by resources and other criteria;
2. The tool supports multiple types of categorizations (e.g. research goals, constraints, wishes) and has flexible ways of navigating through and selecting methods;
3. Entering criteria is done without doubt between two or more options because only then a confident decision can be made;
4. When a criteria value cannot be entered because another criteria overrules the value, this must be communicated to the user (instead of not showing the value at all);
5. Users can directly search for a method by the methods' name;
6. Selection based on necessary resources (budget, time) is not a primary mechanism;
7. The tool supports multiple types of categorization (e.g. research goals, constraints, wishes);
8. The effect of changing criteria/categorization is made visible instantly;
9. The tool gives multiple options/recommendations so that they can be discussed;
10. The criteria and their values are explained so that they are interpreted correctly by the user;

Method information:

11. Information is given consistently, according to a strict framework;
12. Information is given gradually, showing the purpose and the required resources for a method first;
13. The product gives information about the execution of the method in such a manner that the user can execute the method appropriately;
14. Content is revised and new content is created to show the developments of the field;
15. Method information shows the expected level of results and "how effectively it introduces usability improvements into the product";
16. Users are able to use the information of the tool to develop their own methods, to customize or combine existing methods to match with their specific needs and wishes;
17. Method information is being adjusted by involving practitioners in an inspiring and stimulating way;
18. Images and videos are used to explain methods over textual descriptions;
19. Instructions provide a list of necessary equipment, downloads, templates and important considerations;
20. An example is shown of a real study, including preparation and analysis;
21. It is possible for users to make personal notes at methods;

Interface design:

22. The tool can be used by different roles and levels of expertise (novice-expert) in product development;
23. There is no differentiation among users' skill or expertise;
24. Support combining methods as this is something that often happens in PDP;
25. A comparability screen of methods shows a maximum of 10 methods, preferably less than 6;
26. Provide printouts of methods, favourites and share methods;

Miscellaneous:

27. One general database that is accessible by all users and editable by a group of professionals;
28. There is no comment/review system for methods;
29. The relation between methods is shown (both during selection and information level);
30. The tool supports growth in expertise (educational)
12.7 Quotes from study 2.1

From study 2.1, a number of quotes were used in this thesis (especially in chapter 5). This paragraph outlines all quotes, referring to the session (i.e. U1) and the start of the accompanying quote in minutes. Other studies were not transcribed because the data was directly translated into results to fuel quick further development. However, the quotes can be requested by the author.

1. I2.35 "Het is een beetje omslachtig voor het verkrijgen van je informatie. je hebt een character, vrienden, databases, een wereld om doorheen te lopen...."
2. O2.26 "Ik ben heel grafisch ingesteld en de hele grafiek heeft niets te maken met waar je mee bezig bent."
3. O1.56 "het spreekt mij weinig aan want het lijkt me heel omslachtig. Maar als ik dat even weg laat en naar de kern van het concept kijk, dan vind ik dat je mensen kan ontmoten en wat kan vragen wel interessant."
4. O2.9 "Voor die vijf methodes die bij een bedrijf gebruikt worden hoeft je niet speciaal een database voor te bouwen."
5. I2.65 "We hebben binnen Indes een contact personen database, maar die wordt nooit onderhouden. We moeten altijd aan collega's vragen wie de contactpersoon bij dit en dat bedrijf is. Als dat al mis gaat dan vraag ik me echt af of ooit bijschonden gaat worden."
6. I1.72 "Wat mij zou helpen is een instrument waarmee je iedere keer dat je bezig bent met een project informatie op kan halen over onderzoeksmethoden. Dat zie ik veel vaker voorkomen, veel vaker zijn waarde hebben, dan het exploreren. En natuurlijk, als je die database toch hebt, dan kan je altijd zeggen op pagina 1 van 'show me all results'."
7. I1.61 "Ik wil een methode kunnen kiezen op basis van wat objectievare informatie over wat brengt deze methode op basis van de constraints die je hebt vastgesteld"
8. I1.18 "We hebben een aantal methoden die we gewoon heel veel doen. Daar zijn eigenlijk twee dingen interessant. Aan de ene kant het beter maken van dat kunstje (...) Aan de andere kant is het ook wel interessant om soms iets heel anders te zien."
9. O1.19 Vrij gequote: Doelgericht zoeken naar een methode binnen een project gebeurd niet zoveel. Het is meer in de zin van dat er wel eens gekeken wordt wat er is en wanneer het ter sprake komt binnen het project dat het geen dat destijds gevonden is in het achterhoofd zit."
10. P1.54 "Het past goed bij een ontwikkelproces omdat je daar ook heel gestructueerd doorheen loopt"
11. Unilever2/64 "This is how your brain works, from left to right, first constraints than selecting"
12. O1.66 "ik weet niet of ik de selectie wel vertrouw"
13. Indes1/69 "In 5 a tien minuten wil je bepalen welke methode je gaat doen."
14. O1.67 "Hierbij heb je al iets specifieks in je hoofd. Maar als wij iets specifieks in ons hoofd hebben dan weten we meestal al wat we gaan doen."
15. I1.18 "We hebben een aantal methoden die we gewoon heel veel doen. Daar zijn eigenlijk twee dingen interessant. Aan de ene kant het beter maken van dat kunstje (...) Aan de andere kant is het ook wel interessant om soms iets heel anders te zien."
16. O1.26 "Soms willen wij een methode en dan zoeken we een project waar we het bij toe kunnen passen"
17. Indes2/61 "Je wilt snel en degelijk iets opzoeken of ter inspiratie. Ik denk dat je op zoek moet gaan naar iets die een vrijheid voor beide <zoek>methodes toelaat."
18. I2.45 "het is nog een beetje onoverzichtelijk want ik heb nog niet helemaal het idee wat voor resultaten ik kan verwachten bij de verschillende vragen die ik in kan vullen."
19. O2.12 "Vaak heb je al een beetje een vaag idee en binnen een brainstorm zit je te zoeken op..."
21. U1.56 "These questions are so general that you always end up with the same 4 or 5 methods. (...) So do you need the tool?"
22. U1.71 "We are always low on budget, short on time... You need to value it, give it some figures."
23. U2.74 "The danger starts with (...) these things where you can adjust a little bit. That is where you can play around with. It is not a clear yes or a clear no, it is where you are doubtful, where you can put in a maybe."
24. P1.94 "De schuifjes werken ook erg intuitief. Je hoeft geen getallen aan te geven maar je kan het lekker op gevoel doen."
25. I1.38 "ik zou wel gechallenged willen worden door het systeem. Als het te slaaps wordt dan kom ik uit bij wat ik al weet."
26. I1.91 "Het is niet duidelijk hoe deze van die methode verschilt. Er is geen grid of iets dergelijks."
27. I1.73 "Ik kan echt te lang op wikipedia blijven zitten. En waarom... Omdat alles aan elkaar gelinkt is. (...) Soms weet ik aan het eind helemaal niet meer waar ik mee begon."
28. O2.44 "Is er een reden waarom deze links staat en die rechts. "En de afstand groter is tussen die en die. (...) En waarom is die kleiner dan die. (...) Misschien kan je de assen ook wel instellen."
29. I1.91 "volgens mij heb je iets nodig dat je in een oogopslag kan zien wat de verschillen zijn."
30. U2.85 "What I do like is to see other people's experiences with products. I mean... if I go on vacation I use <various sources of reviews>. To see how was this and how was that."
31. O1.27 "Social media lijkt me wel wat. Als Philips Medical deze methode vaak gebruikt dan is het wellicht ook voor ons interessant."
32. U2.96 "sometimes you need to read 20 reviews before you find out that they did not liked the hotel because it was at such a quit location and there was no disco around. But I do not want a disco, so then I wanted to select not to have a disco nearby."
33. U2.87 "I would also not feel comfortable enough to say something about a method."
34. U2.96 "You see so many discussions and so many recommendations. When you do not use a certain number of methods you cannot recommend it. So if you haven't tried something because it is outside your expertise, although it may be a fantastic method, it don't get any recommendations. It leads you down to an alley that makes you feel comfortable because everyone else is doing it, but it may not be the best."
35. I1.65 "De eerste twee regels zij bepalend."
36. U1.77 "For me it would be helpful for the first time. (...) But once we actually run through a method once or twice we don't ever need to go back to this to get a template or so... we would already have it."
37. P1.33 "Ik vind het persoonlijk erg prettig om aan de hand van een voorbeeld te weten wat voor stappen je moet doorlopen."
38. O1.80 "Voor sommige methodes heb je niets nodig, wat ideeën, papier en een pen en je kan gaan. Voor andere methodes heb je weer een heel usabilitylab nodig."
39. I1.107 "Als het teveel tijd kost dan moet je het verkopen naar de klant en dat is niet makkelijk. het zou ook handig zijn dat als je bij die templates ook een korte omschrijving hebt die je toe kan voegen bij je offerte."
40. O1.103 "Als wij kunnen beargumenteren dat het belangrijk is dat deze methode wordt uitgevoerd dan kan dat bijna altijd wel."
41. I2.22 "zelfs als dit ding mij vertelde dat ik een focus group sessie zou moeten doen, dan weet ik eigenlijk nog steeds niet hoe ik de methode uit moet gaan voeren want binnen focus groups heb je nog zoveel andere verschillende 'submethodes'."
42. O2.74 "Waar is de rating op gebaseerd?"
12.8 Acknowledgements

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Thank you!