Pervasive and Persuasive Systems in Information Architecture

Communicating with Users

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Abstract

This thesis came to life through a combination of casework with the Aalborg-based company Ideaal and a thorough examination of the three scientific fields of information architecture, persuasive technology and pervasiveness. It set out to answer the question of how a company can entice their customers to utilise an information system to communicate with that company through. In this case, that information system was Podio.

In the thesis, the hermeneutic circle is employed to first understand the theories of information architecture on how to establish categorisation and then how to use that categorisation when building the first three of the four systems of information architecture: organisation, labelling, navigation and search. The latter of these systems was excluded in an effort to focus on the other more closely connected systems.

After having established the groundwork for information architecture, the same approach through the hermeneutic circle was applied to both the fields of persuasion and pervasiveness. In these fields, several other key elements to answering the research question were discovered, and a big overlap between the three different fields was unveiled.

Once the theoretical background was established as empirical data for the thesis, a further discussion on the principles of the three different scientific fields and how they interconnected was done. Through this discussion it was determined that a persuasive and pervasiveness information architecture could be achieved by combining the key strengths from each field into one.

This newly gained knowledge was then utilised to conduct a thorough analysis of the different elements of the information system Podio, more precisely what worked well in the system and what issues would have to be resolved if Podio was to be a viable solution for the company in the casework.

Having then determined these strengths and weaknesses in Podio, a new information architecture for Podio was developed, however, due to the limitations of the Podio platform these changes could not be implemented in a real world scenario. Instead, the new information architecture was presented through a series of mock-ups that illustrated what could be changed for the better in the future.

This led to the conclusion of the thesis, wherein it was determined that in order to answer the research question one would have to employ theories from all three different fields in a combined manner to achieve a result that would actually solve the issue. Persuasive technology could be applied on a micro scale to particular elements in an information system, if this was done well enough that could then be expended up to a macro scale and become truly pervasive throughout the system, and lastly that that would have consequences for how information architecture is designed.

Preface

This thesis is the culmination of two years of work in the Information Architecture programme of Aalborg University. I would like to thank my supervisor Marianne Lykke for her assistance and enthusiasm not just in the creation of this thesis but throughout the entire programme.

I would also like to extend my thanks to the company Ideaal for their interest and backing in creating the casework that helped shape this thesis. I would especially like to thank my main contact within the company, Christoffer Mørch, for his help, ideas and interest in the process of creating this thesis.

Lastly, I would like to thank my girlfriend for her unwavering support during stressful times.

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1. Introduction

This chapter serves as an introduction to the subject at hand for this master thesis. In itself, it offers little of academic value, but it is an explanation of the thought process and idea generation that I have gone through over the past semester culminating in this thesis.

During the winter of 2013, I was introduced to a company called Ideaal by my supervisor Marianne Lykke. It is a small company specialised in dealing with product design for their clients, and the company needed a more efficient way of communicating with these clients. The company used several different traditional communication channels with their clients including phone calls, e-mails and meetings, but they would also like to incorporate the web-based collaboration service *Podio* into this process.

The subject of information architecture enters this process whenever some type of information has to be fitted to a particular medium. The information architectural systems of labelling, organisation, navigation and search offer an explanation and guide as how to best optimise any digital information system to a particular type of content.

The theories of information architecture are a fairly new field of interest for scholars and HCI-professionals, and as such, the data surrounding it is not necessarily as well established as those of related fields. This does not mean that information architecture exists in a scientific void, but rather that it is scientific field with room for expansion and combination with several other fields such as pervasiveness and persuasion.

Taking the empirical data for information architectural concepts into account, the case with Ideaal allowed me to examine closer how information architecture relates to persuasion and pervasiveness. The hope was that I would be able to present them with an analysis and a set of ideas that they could use to entice their customers to use Podio as an information system and thereby communicate with them through that rather than the more traditional communication channels.

Using the knowledge that I had gained during the previous three semesters in the information architecture programme of Aalborg University, I was able to select which theories from other related fields that would help me as a researcher ascertain new knowledge in both information architecture and how it overlaps with other areas.

1.1 Problem Area

The subject for this thesis then is not a narrow and specialised one, but rather a study in how theories from several different fields can supplement each other. The underlying case of Ideaal and Podio is merely a starting point from which to tie this work into the real world, and the actual scientific part of the thesis is generated in the empirical data gathered from the underlying fields.

The main problem area for the case is that of applied information architecture and how it ties into the fields of persuasion and pervasiveness in particular. This is because I find it impossible to explain the concepts of information architecture without drawing on pre-established knowledge in those other fields. This also means that I can attempt to establish new knowledge within the overlap of these different fields.

Following this model means choosing a methodology that supports it, and there were several different routes for me to take. I could have utilised the methodology of participatory design for creating a much more case-based thesis, or I could have employed a more phenomenological approach that could then be backed up with quantitative research afterwards. Instead, I have chosen to examine the already-existing literature and empirical data on the subjects of the thesis and, using hermeneutics, combine these to reach a new and better overall understanding.

1.2 Research Question

I plan to utilise hermeneutics by stating a research question and underlining this with two hypotheses. My prior knowledge on the subject will then allow me to seek new knowledge to either prove or disprove these hypotheses and provide an answer to the research question. I will explain this process more in-depth in the following chapter on methodology.

The research question for this thesis is as follows:

How can a small company utilise the systems of pervasive and persuasive information architecture in communicative settings with their customers?

I would like to elaborate on three parts of this research question. Firstly, the reason that the question is angled towards small companies is the casework with Ideaal. It is possible that the work on this thesis will prove to be applicable to larger companies and information systems as well, but my main concern is not whether it is or not. Secondly, the reason I wish to look at both persuasive as well as pervasive information architecture is that I hope to establish new knowledge in the overlap between the two rather than digging deep down into one single field. Finally, the reason I use the term "communicative settings" is that I feel that restraining the research question to only concern, for instance, intranets or websites might be unnecessarily limiting. In this context, I consider the communicative setting to be the process of introducing the customer to an information system and having the customers return to that same system regularly to keep the communication process flowing between the company and the customer.

In other words, this is not a thesis on the communicative process in itself. That is an entirely different field. Rather, this is a thesis on how to employ a pervasive and persuasive information architecture in an information system, and how to use those two fields to promote usage and communication through that system. Once I have established this, I can then apply this new knowledge to the information system Podio.

Answering the research question is the ultimate goal of this thesis. Before answering, though, I will be stating the following two hypotheses that I believe to be true from my prior knowledge on this subject. These hypotheses are going to dictate which theory and empirical data I employ in this thesis.

1. For a company to communicate efficiently through an information system that system must stay consistent and pervasive in its application.
2. For a company to entice its customers to use, and keep using, a new information system for communication that system must offer persuasive elements that the currently employed communication options do not.

From my current understanding of this subject, I hold these two hypotheses to be true. It may in fact turn out that they are not, and if so, I will have to revise them in my concluding thoughts. However, whether they prove accurate should not influence if I answer my research question or not, only how I do so.

These are my introductory thoughts and merits for wanting to complete this thesis. In the next chapter, I will be explaining how I plan to do this through hermeneutics and applying the hermeneutic circle.

2. Methodology

As discussed in the previous chapter, there are several different ways of dealing with the challenges posed in the research question, but information architecture as a subject deals with how information systems work with each other and how those systems affect their users (Morville & Rosenfeld, 2006, p. 4). Therefore, it makes sense to approach the problem of applying information architecture from the point of the humanistic sciences. That view, of course, still leaves several different approaches, but one of the most well-known and respected ones is that of hermeneutics.

2.1 Gadamer's Hermeneutics

Hermeneutics in its essence is the study and interpretation of texts. Historically the term has only been applied to religious texts but later on the theories and practice has been extended to other literary works as well (Baldick, 2008). Hermeneutics, being an almost ancient study, has seen several revisions and re-imaginings over the years. This structure and methodology applied in this thesis is based on hermeneutics as conceived in philosophical hermeneutics by Hans-Georg Gadamer.

Gadamer was not the first philosopher to use the term hermeneutics in a philosophical sense, but he did expand greatly upon the ideas of other philosophers like Wilhelm Dilthey and Martin Heidegger (Schmidt, 2006, pp. 29, 51, 69, 99). Gadamer released *Truth and Method* in 1960. This is considered his magnum opus and is very important in a scholarly context, because Gadamer challenged the way humanistic sciences had been done up until this point. Gadamer criticised the fact that the humanities were approached by the same model that the natural sciences were (Gadamer, 2004, pp. 86-87; Schmidt, 2006, p. 95).

Before Gadamer, other philosophers like Friedrich Schleiermacher and Dilthey had worked with theories on how to abandon the dated view of considering hermeneutics to be about finding the one truth in a text (Schmidt, 2006, p. 95). Hermeneutics at this point was about interpreting a text to the point of complete truthful understanding of the author's intention. Schleiermacher changed this view by shifting the focus of the text itself to also understand the psychology of the author. Dilthey further challenged this by not only including the psychology of the author, but also the historical perspective that the author had written their text in (Schmidt, 2006, p. 99).

Furthermore, Heidegger had created the framework for what would later be described as "the hermeneutic circle". The idea that any text interpretation is an almost living process that is constantly being changed by reading a text, interpreting it and then re-reading it. The idea is that the reader would need to enter the "circle" and then keep going around it until a satisfactory level of understanding had been achieved (Schmidt, 2006, pp. 73-74).

Gadamer took the thoughts of Dilthey in particular one step further and changed the entire discourse from being about what an author wanted to say and instead stated that there was no way to objectively look at a text without considering one's own historical and philosophical background as well. Gadamer calls this term describing out pre-conscribed notions of an author and their text "prejudices" (Gadamer, 2004, p. 225; Schmidt, 2006, p. 102).

The main idea of Gadamer then is that he wanted the individual reader to be aware of these prejudices and try to set those aside while interpreting text. Gadamer further expanded this idea to be covered in Heidegger's hermeneutic circle (Gadamer, 2004, pp. 297-298).

2.2 Applying the Hermeneutic Circle

This thesis is a literary study in the sense that I will regard several different sources on several different subjects and then reach a new understanding of the "whole" truth. This is a slightly modified way of regarding the traditional hermeneutic circle of Gadamer, because he was mainly talking about how to interpret a single text from within the confines of its historical and philosophical limitations.

However, I feel that the hermeneutic circle is very applicable to different types of text to create a broader meaning as well. Gadamer argued that the hermeneutic circle could be used to bridge the *temporal distance* between the author and the reader, if only the reader was aware of all prejudices (Gadamer, 2004, pp. 306-307; Schmidt, 2006, p. 106).

Gadamer said that once the reader has closed some of the temporal distance between the author and themselves they have started to fuse the horizons of the two. This is what Gadamer regards as true understanding of what a text is about and that these newly fused horizons is where new knowledge is created (Gadamer, 2004, pp. 306-308; Schmidt, 2006, p. 107). I would argue that it is possible to fuse even greater horizons if I gather materials from several different fields in order to achieve a greater understanding of a single subject.

In this thesis, I will apply the hermeneutic circle of understanding to all the different texts that I will be using for empirical data. What I want to achieve is an understanding of how the subjects of persuasion and pervasiveness apply to an information architecture system. Therefore, I will be using texts from all three different fields, and after that, I will attempt to fuse the horizons of all the different fields into a new and broader understanding.

Gadamer stated that any hermeneutic experience needed application to be complete (Gadamer, 2004, p. 308). By this, he did not mean that in order to understand a given text one needed to apply it to a concrete case. What he instead meant was that application of the core text itself is necessary for complete understanding (Gadamer, 2004, p. 341). This thesis does indeed contain a case that the theories in the empirical data can be applied to, but, as Gadamer stated, this is not necessary for the understanding of the core concepts.

This is the reason why I have chosen the hermeneutic circle as a way of working with these concepts. By applying the hermeneutic circle to several different theories and then closing the temporal distance between those and I, I hope to create new knowledge in the gap somewhere between the three different fields. Once I have established this new knowledge, I will present it through a discussion, and I will also complete an analysis of Podio and make suggestions as to how this new knowledge could be applied to that system through a combination of customisation of Podio, mock-ups and models describing the desired changes.

This thesis then becomes a heuristic study of empirical theory developed by others and an examination of how those theories work together. This means we will have to establish a strong theoretical background, before we move on to an actual analysis and discussion of the results thereof.

In the next part, I will outline these theories and explain how they work in the broader picture of this thesis.

3. Theory and Empirical Data

The following chapter is an account of the different scientific fields and certain specific theories therein that I will be utilising later in the discussion and analysis part of this thesis. This chapter outlines the theoretical framework for three different fields (information architecture, persuasion and pervasiveness), and the different theories presented will serve as the empirical data and justification for broadening my understanding in the previously discussed fused horizons of all three fields.

I will be presenting the three different fields throughout this chapter, and I will focus on how they overlap and interact with each other in the following chapter containing the discussion and analysis. The theories and ideas in this chapter are only fragments of their respective fields, but in the interest of staying within the confines of this thesis, I will limit the presentation to those parts of the different fields that I find firstly to be most interesting, and secondly to have the most fascinating overlap with the other presented theories.

All theories presented herein have been examined and interpreted through the theory of the hermeneutic circle as explained in the previous chapter on methodology, and this is what has led to me now being able to show these.

3.1 Information Architecture

The field of information architecture is, of course, the most important one involved in this thesis. It is my personal field of expertise, it stands as the framework for all the decisions made herein, and it is the overarching subject.

However, it is difficult to explain exactly what information architecture is. Looking all over you would find several different definitions all pointing in somewhat opposite directions. But for me and for the sake of this thesis, I will regard information architecture as being a set of loosely defined rules and ideas pertaining to how one can store information in information systems. This includes, but is not necessarily limited to, how to physically store the information by structuring and organising it and also how to promote findability for users for said information again once it has been stored.

As information architecture, in most cases deals solely with the organisation of information in virtual systems like databases rather than physical ones such as libraries, and since information architecture is concerned with usability and user friendliness rather than pure performance, it almost goes without saying that we are talking about a fairly young field (Morville & Rosenfeld, 2006, p. 19). This is both a strength and a weakness.

The young age of the field makes it a very interesting, dynamic and adaptable subject, because information architecture is still being defined to this day. This is in starch contrast to ancient fields like, for instance, linguistics or mathematics that still see new discoveries and research but not in the sense that it completely redefines the subject at hand. Information architecture could potentially, one day, be all about labelling information in databases and the next be expanded to structuring posters in a physical exhibition. This is great, because it allows newcomers to the field like this author to expand and grow within as well as with the field itself.

On the other hand, information architecture is hard to both justify and utilise, because the field lacks a lot of the mountains upon mountains of empirical background data that older fields have long established. This means that in a fair amount of cases an information architect is just as much of an artist as a scientist, because the information architect will have to make design decisions with their information systems that just *feel* right rather than have an empirical justification.

With these things in mind, it is time to move on to what empirical data we actually do have to justify the field. I would argue that it is impossible to discuss information architecture in a modern online setting without including Peter Morville and Louis Rosenfeld's *Information Architecture – for the World Wide Web*. The third and most current, albeit in internet time a bit dated, revision of this book is from 2006. Morville and Rosenfeld have used their combined experience within the field since 1994 to create not a textbook for students but rather a handbook of the overarching ideas and subjects of information architecture (Morville & Rosenfeld, 2006, p. 55).

This means we run into the problem of missing empirical data like statistics and studies on the subjects discussed in the book, because Morville and Rosenfeld are speaking from personal experience. However, I only find this to be a problem if you open the book with the intent of following it to the letter on exactly where and how to do what in any information system "because the book says so". I do not believe this to be the goal of the book, and I find it to suit the purpose of this thesis as a primary source for establishing terms and broad ideas in the field quite well. In other word, the book explains what something is rather than how to do it.

Another thing of note with regards to Morville and Rosenfeld is that they wrote their book specifically for online settings, but I would argue that any user interacting with an information system would go through the same thought processes whether they were accessing the system online, offline or from an intranet.

Categorisation and Organisation

By far the most important discipline in information architecture is the art of organising information into different categories. Both in the sense that the user has to be able to correctly identify the information afterwards, but also in the sense that the machine on the other end has to be able to accurately store it (Morville & Rosenfeld, 2006, p. 54).

The best way of getting this two-way relationship to work is by adequately classifying and organising the information on the software backend and in the user interface in the first place. The importance of doing this correctly can be traced back to studies on categorisation and linguistics in the 1950ies and 1960ies, when researchers first started to challenge the classic view of only categorising things together that shared certain common properties (Lakoff, 1987, pp. 5-6). Back then, researchers like Wittgenstein and Austin, of course, were not concerned with usability in modern computer systems, as they had not been invented yet. At least not in the sense that we have them today. This does not mean, though, that what they had to say on categorisation in language is not hugely important in how we build user experiences today.

Wittgenstein was the first researcher to challenge how categorisation theory had been done up until the 1950ies. He argued that rather than how the traditional theories on categorisation had been focused on how categories have clear boundaries defined by common properties, they should instead be defined by a sort of family resemblance (Wittgenstein, 1953, pp. 66-70; Lakoff, 1987, p. 16). Wittgenstein used the example of the category of *games*, arguing that not all games have a shared common property that identify the fact that they are indeed games. Not all games have clear winner, not all games involve skill, and not all games involve luck (Lakoff, 1987, p. 16). Many other traditional categories have the same issue with not having clear boundaries, yet semantically most people would be able to identify two entirely different games as belonging to the overall category of *games*. Instead, categories seem to have an ability to bond by other things such as metaphors and metonymy (Lakoff, 1987, pp. 19-20, 77-78).

Wittgenstein also noted that categories could expand their boundaries over time to include new members that previously either did not exist or belonged to other categories. He regarded categories as dynamic and breathing things that could be modified over time rather than fixed groups. He also noticed that some groups

in a category might be more important, or at least have more pure and defining qualities, than other groups in the same category. Wittgenstein used the example of the category *numbers* wherein he regarded integers to be a more important group than, for instance, irrational numbers (Lakoff, 1987, p. 17).

Austin looked at the same problem as Wittgenstein but from the perspective of language and linguistics rather than categories themselves. He asked himself "why do we call different things by the same name?" which is essentially the same question Wittgenstein asked himself but from another view (Lakoff, 1987, p. 18). Austin basically deduced that categories are derived from some unexplainable human understanding rather than an arbitrary set of rules (Lakoff, 1987, p. 21). The two researchers came to more or less the same conclusion in two different, albeit related, fields.

Categorisation as explained by Wittgenstein and Austin is still immensely important to this day, because it helps us understand how organisation in information systems work. Even if they were never considered when the theories of the two researchers were developed.

Whether Morville and Rosenfeld stood on the shoulders of Wittgenstein and Austin, when they wrote their book, I do not know. However, their ideas on organisation schemes in virtual systems do seem to correlate very well with the ideas developed 50 years earlier. Morville and Rosenfeld suggest that there are two different kinds of organisation schemes that each have their own subsystems. All these different subsystems have their own strengths and weaknesses (Morville & Rosenfeld, 2006, p. 59).

Exact Organisation Schemes

The exact organisation schemes are, usually, very easy to both develop and utilise afterwards, however, they are also very limited in their application. The strength of these types of schemes is that they are completely unambiguous and therefore support *known-item* searching very well. The problem with these schemes is that they do not promote any type of exploration or ambiguousness (Morville & Rosenfeld, 2006, p. 59). In many regards, these types of schemes are very much like the traditional view on categories with fixed boundaries defined by shared common properties.

Morville and Rosenfeld list three different types of exact organisation schemes. The *alphabetical*, the *chronological* and the *geographical*. There are certainly other types of these schemes, and hybrids can exist as well, but these three are the most commonly used ones (Morville & Rosenfeld, 2006, p. 59).

The alphabetical organisation scheme is purest of them all. A clear-cut alphabetical index that lists objects of some category in order. Think dictionaries, phone books and personnel directories (Morville & Rosenfeld, 2006, pp. 59-60). These schemes let the user easily search for some property that they know in advance. If the user is looking for the definition of a word, all the user has to know beforehand is the word itself. If the user is looking for the phone number for a specific person, all that the user has to know is the name of that person. These schemes can also be sub-divided into other categories like the yellow pages that contain groups of categories divided by profession like plumbers or carpenters, but at that point, the scheme starts to creep into the territory of other more ambiguous organisation schemes.

The chronological organisation scheme is almost as well defined as the alphabetical one, however, instead of being organised by the alphabet, it is organised by chronological time. This scheme only supports certain types of information, as any information stored in it must have a logical date to assign to it (Morville & Rosenfeld, 2006, p. 60). This scheme can work for anything that follows a historical system of some sort. An example of this could be an archive of news articles on a website or the timeline on Facebook. The only thing it requires is that there is no ambiguity about the date of when something happened. If there is no such

ambiguity it is easy to index items in an order where they make sense, however, just because something can be indexed by time this does not mean that it should only be indexed by time.

The final exact organisation scheme is the geographical one. This scheme can be anything from a local scheme to a global one depending on the information contained therein (Morville & Rosenfeld, 2006, pp. 60-61). Morville and Rosenfeld never went into any real depth explaining or researching these types of schemes, because geolocation by IP and GPS in smartphones were only utilised on a very limited scale back in 2006. However, this has become much, much more pronounced over the years, with companies like Google using geolocation in their API for Google Maps or the equivalent used by Apple, meaning that users will now have local search results displayed to them if they search for special trigger words like restaurants or museums. The API can also be self-aware without needing input from the user and, for instance, display the weather forecast for the location the user currently has their smartphone in (Google Inc., 2014; Apple Inc., 2010).

Organising things by location has then become a more seamless experience for the user over the years. Where Morville and Rosenfeld focused on the findability for the user by being able to look things up according to where they physically where in the world, it is now something that happens more behind the scenes and with the user needing to do any actual input.

Ambiguous Organisation Schemes

Thus far, I have looked at organisation schemes that are easy to build and maintain in the sense that they contain item groups that can be universally agreed to belong together. Things become a lot muddier once we start looking at subjective organisation schemes where someone has to make an arbitrary categorisation of different types of information.

Morville and Rosenfeld refer to these types of organisation schemes as being *ambiguous*, and they differ from the traditional categorisations of the exact organisation schemes by containing items that it cannot be universally agreed to group together (Morville & Rosenfeld, 2006, p. 61). It makes the process of categorising this information a much harder task, however, it is within these ambiguous schemes that the power of the World Wide Web truly shines.

Where the exact schemes make it very easy for a user to find a specific piece of information that the user is aware of that they are searching for, the ambiguous schemes allow the user to find information that they either did not know that they were looking for or only have a very limited knowledge about. Morville and Rosenfeld refers to this type of information searching as an iterative process in associative learning (Morville & Rosenfeld, 2006, p. 62).

For example, if a user knows that they are looking for the phone number of a specific person it is a relatively easy task to look up that name in a directory of phone numbers. However, if the user has a rodent problem and does not know the name of an exterminator they will have to look in a directory of professions wherein the user can then find a random professional in the exterminator category.

However, before the user can look such a professional up anywhere, someone, somewhere will have to have created that directory and a category of exterminators within that directory. Someone has to have made a conscious decision to group all exterminators together under that specific tag. This is just one example of how things can be categorised in an ambiguous scheme. Another strength of the ambiguous schemes are their power to expand and contract by need as some categories grow smaller and others larger. This is essentially exactly what Wittgenstein pointed out as the problem with traditional categorisation long before the internet even existed (Lakoff, 1987, p. 17).

In their book, Morville and Rosenfeld list five of the most common ways to create ambiguous organisation schemes. However, like the exact organisation schemes, there are certainly other ways of doing it, and their list is by no means complete. The five ambiguous schemes that they mention are by *topic*, *task*, *audience*, *metaphor* and *hybrids*.

Creating categories by topic is perhaps the most widely used and useful of all the methods, but while none of the ambiguous schemes are *easy* to create, dividing objects by which topic they are related to is one of the harder ways of doing it (Morville & Rosenfeld, 2006, p. 63). Still, a well-designed categorisation by topic is one of the most intuitive ways of organising content.

Returning to the example of the user needing an exterminator, the directory of professionals divided into professions, like *exterminators*, is an example of a topically organised scheme. Again, someone will have to have made that distinction somewhere in the process for that category to exist. Furthermore, they will have to have labelled it exactly that for it to make sense for that specific user, but more on labelling systems later.

It is important to consider the entirety of content in an information system before creating a topical division of that content (Morville & Rosenfeld, 2006, p. 63). If the content covers and huge amount of data relating to all sorts of different things like in the case of encyclopaedias such as Britannica Online and Wikipedia, the categoriser must use much broader categories, at least at the top level, than if the information system only functioned as a sales outlet for a furniture store like IKEA. In the first example the entire organisation structure will be much deeper simply because the encyclopaedias contain that much more information than in the latter example where IKEA only needs to index their furniture (and other functions of the website) letting them use much narrower definitions in their categories.

Creating an organisation scheme following tasks is in some ways related to that of the topical scheme. However, where the topical scheme is divided into what the category contains, the task scheme is divided into what the user might want to do within that category (Morville & Rosenfeld, 2006, p. 64).

The task scheme has been used widely in computer software almost since the birth of modern user interfaces in the sense that actions can be divided into categories. An early example is Microsoft's ad campaign for Windows 95 where they attempted to change focus from what an operating system could do to what the user could do with that operating system by asking *"Where do you want to go today?"* (Elliot, 1994). As an actual software example, Adobe Photoshop lets the user choose between categories of action labelled under *Edit*, *Select* and *Filter*. All three different examples contain items that let the user do something related to the label of the category to the image that they are currently working with.

Later on, desktop software and their online counterparts have started melting together, and it seems like the difference between what is considered a desktop software and what is considered an online application is dwindling with applications like Microsoft Office and Outlook moving to an online environment (Microsoft Corporation, 2014a; 2014b). This has had the consequence of companies streamlining the experience of their software to match each other in offline as well as online settings. Following that trait, several websites now use task schemes to complete, at least some, actions on their websites (Morville & Rosenfeld, 2006, p. 64). Clear examples of this are sites with labels like "Contact us" or "Find a Store", both of which are used by large corporations like Starbucks, Walmart and Best Buy.

The downside of the task scheme is that it does not completely fulfil the need for an organisation scheme on most websites, unless those sites are very narrow in their spectrum. This leads to the task scheme mostly being used in coalition with other schemes to fulfil the need for the entire website (Morville & Rosenfeld, 2006, p. 64). More on the *hybrid* schemes later.

The third ambiguous organisation scheme, the one defined by the audience, is somewhat related to the topical scheme. Morville and Rosenfeld use the scheme of Dell that divide their website into two different areas between home users and business users, but really, any website that caters to two or more different audiences likely uses this scheme in some way (Morville & Rosenfeld, 2006, p. 65). In a broader sense, this type of organisation scheme can also be used to separate entirely different user groups in a closed system where some users might have more or different options than other users.

For instance, the WordPress CMS allows the site owner can set up completely different roles on a site related to what those users might need to do. If it is an ordinary visitor that is solely on the website to read the material available to everyone, they will be regarded as a *guest*. If it is an ordinary visitor that also wants to be able to follow articles and updates, they will need to create an account to be upgraded to *subscriber*. The hierarchy goes up from there to *contributor*, *author*, *editor* and *administrator* each having more options and capabilities than the last, ending with the *super admin* that could take down or change the entire site if they wanted to (WordPress, 2014). Whatever the user actually is, they will be served only the options that are available and relevant to them. From a very narrow set of options at the bottom of the food chain to absolutely everything at the top.

Just like with the task scheme, though, the audience scheme is neigh impossible to use as the sole organisation scheme on anything other than a very narrow and specialised website. It will have to use a mix of other organisation schemes as well. However, it can be very helpful to help limit the amount of unnecessary options for users in order to promote better findability for them (Morville & Rosenfeld, 2006, p. 66).

The fourth and final actual ambiguous organisation scheme mentioned by Morville and Rosenfeld is that of the metaphorical scheme (Morville & Rosenfeld, 2006, p. 66). This final scheme is used all over, often without the users even noticing, and it is more closely related to the labelling system than all the other organisation schemes.

Users have often become so accustomed to metaphors in their information systems that they hardly ever notice them anymore if done correctly. Metaphors for groups that can be hard to put into a named category can sometimes be grouped together under categories that make sense when explained as a metaphor. If the information system allows for visual metaphors, the possibilities become even larger (Morville & Rosenfeld, 2006, p. 66). For instance, while using the word *save* might even be considered a metaphor in itself, as the actual set of options has nothing to do with saving the content from harm's way but rather storing the content on a physical disk or somewhere on the internet, some software will instead just display a visual metaphor in the form of a picture of a 3.5" floppy disk. Although I have no data to back this up with, I would imagine this practice as being less used today than earlier since more and more users would have never used an actual floppy disk. However, back in the 1990ies everyone was using floppy disks to transfer stored information around. This, in turn, made it a feasible visual metaphor to have users click on a floppy disk if they wanted to store information on some medium.

There are plenty of metaphors being used to this day, and especially with less tech savvy users, the practice can make a lot of sense and highly promote the usability of one's software (Morville & Rosenfeld, 2006, p. 66). Nevertheless, the danger of using an entirely made up metaphorical organisation scheme is that things can quickly become unclear and unintuitive if the metaphors are not clear representations of the options that they actually offer (Lakoff, 1987, p. 76). Therefore, this organisation scheme will also, like the two previously mentioned ones, often need other supplemental organisation schemes.

This brings us to what Morville and Rosenfeld have dubbed the hybrids. Hybrids are not truly an ambiguous organisation scheme in themselves but rather a catch-all for all the information systems out there that have some combination of two or more of the mentioned organisation schemes (Morville & Rosenfeld, 2006, p. 66). While in theory it would always be preferable to choose one organisation scheme and stick to it, this is rarely possible, or even preferred, in the real world where information systems have to offer several different types of options for several different types of people.

Morville and Rosenfeld especially warn us that hybrids can cause confusion, especially when used excessively, and once your information system starts scaling up, the users would be much better served with a more structured, if less versatile, organisation scheme (Morville & Rosenfeld, 2006, pp. 66-68). In addition, if we look back on more classical categorisation theory it becomes clear that mixing and matching too much in what we define as categories and what they contain, can quickly become infinitely harder to maintain (Lakoff, 1987, pp. 26-29). This is obviously not what we want if we are looking to promote findability for our users.

On another note, one area where the datedness of Morville and Rosenfeld's book shows is on that of user interaction with the organisation schemes. Their book was developed in a pre-web 2.0 world, and they oftentimes make the assumption that the users themselves can only have a customised experience in the sense that the website owner has set it up for them. Examples of *tagging* and so-called *recommender systems* have become much more widely available since then, where the user has much more influence on their own experience on the organisation scheme of a site but also on that of other people (Gedikli, 2012, pp. 21-23, 89). This, however, does not mean that Morville and Rosenfeld where wrong in their original observations of the World Wide Web, but rather that more possibilities have come to since then.

Labelling and Navigation

All the different systems of information architecture are closely intertwined. This also goes for the labelling of both categories and navigation systems in information systems. Just like with the organisation system, the labelling system has roots going back to categorisation theory.

Where the organisation system decides where things physically, or rather, virtually, go within a given information system, the labelling system decides what to name or with what to depict those different categories of information. Just like with the organisation system, there are several different approaches to labelling things. Morville and Rosenfeld have researched and accounted for the ways of doing so into four different groups. They also accounted for several different ways of developing navigational systems on websites, and the following is an outline of how these two systems interact with each other.

Morville and Rosenfeld classify the three main types of navigational systems as the *global*, *local*, and *contextual* systems (Morville & Rosenfeld, 2006, p. 116). They also mention several other types of more localised or supplemental systems that can be used to enhance the navigation on a website but are rarely able to stand alone (Morville & Rosenfeld, 2006, pp. 131, 139).

However, before we consider how to employ each navigation system let us consider the labels that we are capable of using for categorising the information in the navigation system. Labels can be difficult in the sense that, just like with categories, it can be a challenge to find a single label that properly contains all the information that we would like presented within that category. This goes back to the issue of categories have fuzzy boundaries and sometimes only making sense because of human interpretation (Lakoff, 1987, pp. 21, 26-30). If we cannot properly define in words what a given category contains, how can we hope to label it properly? The problem becomes even more pronounced in a navigation system where there will most likely not be more than a couple of words available for the creator.

I would regard the most important labelling type is labelling as headings. I find this to be true, because any information presented in any written medium should always have a heading that, if not explains then, at least describes what the content is about.

If at all possible, the content creator should aim to be consistent in their headings and possibly have their headings divided into a hierarchal nature. Just like this thesis is divided into headings, subheadings and sub-subheadings, any information system of a decent size should have a visual indicator that tells its users what they are currently viewing, and which other places they could go to in the system instead (Morville & Rosenfeld, 2006, pp. 90, 122-123).

The second type of labelling is that of contextual links. These are a bit more loosely defined and do not necessaryly stand out as much as headings will. Contextual links are just that, contextual. Either they are found within the body of the text in the information the user is currently viewing or at least close to it, and they are strongly related to the topic at hand. Contextual links are not bound by the shortness of header labels, but should, of course, still not span over several lines of text (Morville & Rosenfeld, 2006, p. 88). Another advantage of the contextual links are that they are not bound by the same level of consistency as header labels. One could argue that they should always look the same when it comes to font size, colour, etc., but they do not always have to point to the same type of content. The content creator is freer to decide if they want a contextual link to go to another subpage, the frontpage or perhaps even an outside source (Morville & Rosenfeld, 2006, p. 88).

Another way of labelling information is indexing terms. These can either be user generated (as with social tagging), generated by the content creator (as with keywords) or even completely hidden from the user (as with meta keywords). Each approach has its own pros and cons, and not all information systems have the ability or even need for any of them (Morville & Rosenfeld, 2006, pp. 95-97). However, in some prospects they do give the creators an alternative way of labelling information instead of the more conventional ones.

The final labelling form that I will mention here is that of the iconic labels. These are labels where words have either been completely replaced or at least supplemented by a depicturing of something that describes the content found within. Just like with the metaphorical organisation schemes, these types of labels have a strong advantage in that they can explain a specific piece of content without necessarily having to put it into words. They can also greatly help usability with users that are less experienced with a given system by giving them a metaphor for a concept that they have yet to fully understand. The downfalls of these types of labels also share properties with the metaphorical organisation schemes, as the meaning of them can easily become mudded, and it can be difficult to stay consistent with them as a system grows bigger and expands (Morville & Rosenfeld, 2006, pp. 66, 97-98).

Moving on from the types of labels, let us look back on the three main types of navigation available in an information system.

The **global** navigation system is the main structure offered to users for working their way around the system. Global systems are by far the most important ones in any system, as they are omnipresent throughout the entire system. They also usually serve the users with the most important categories of information at the main level, meaning that if the creator gets the global navigation system wrong, the navigation throughout the rest of the system will suffer dearly from it. In a very small system, this may in fact be the only form of navigation. Being present in every part of the system, the global system will usually be a bar or a menu in either the top or the left-hand side (Morville & Rosenfeld, 2006, p. 122).

What is just as important, as what the navigation system actually offers, is the way that those options are labelled. The labels used need to communicate adequately to the users what type of content they can expect to find under that label. This can be done either through header labels, iconic labels or a combination of the two depending on the layout of the system. What is perhaps more important than how the labels are formed is that they are consistent with each other and stay that way throughout the system. The global system is not the place for experimenting with contextual links or labels that change to reflect the currently viewed content (Morville & Rosenfeld, 2006, pp. 92, 122-123). In many systems, it can also be very beneficial to use semantics that are familiar to the average user of the system. An example for this could be using the word *Home* or an icon depicting a house to signify going back to the frontpage, it could be the words *Contact Us* or an icon depicting a speech-bubble to take the user to a contact page. Both examples are fairly well established in the online world, and even if they do not seem immediately intuitive, most users will be familiar with the terminology (Morville & Rosenfeld, 2006, p. 93). No matter what the application the important part is that the users have a fairly solid idea of what they are clicking and why. In some cases, the creator can apply mouse-over tips to what the actual menu buttons do, but in general it is preferable to have labels that are representative enough to not need further clarification (Morville & Rosenfeld, 2006, p. 94).

The **local** navigation system(s) can, and in fact should, change depending on what the user is currently doing or viewing in the system. Where the global navigation system is singular, concise and consistent, the local navigation is adaptable and adjustable to the current needs of the user (Morville & Rosenfeld, 2006, pp. 124-125). In principle, the local system can act completely independently of the global system, but to stay within the boundaries of familiarity for the users the creator may want to at least have the local navigation presented in a style that is somewhat like that of the global system.

This means that the local system can also be presented through either (sub)header labels or icons. Though one needs to consider the fact that even with a small global system, the local systems can grow very complex over time. It might be preferable to stay away from icons in that they would need to clearly represent more and more convoluted options the further down the structural hierarchy the user travels. Instead, sticking with descriptive headers that are consistent in the organisation scheme that they follow are not only easier to create and understand but also fair easier to maintain as the system develops and grows over time (Morville & Rosenfeld, 2006, pp. 67, 98, 125-126).

The third and final navigation system is the **contextual** one, and it is harder to define and establish in a system than the two more traditional navigation systems. A contextual system can be several different things, but it will usually consist of directly inline contextual links, usually represented as an underlined word or a sentence, or it can consist of a small menu off of the side of the content that will present the user with other topics that somehow relates to that which the user is currently viewing (Morville & Rosenfeld, 2006, pp. 126-127). The strength of contextual links is that they offer users a way of quickly travelling between related content, the weakness to this strength is that someone will have to make an, at least partially, conscious decision to link two different pieces together. The nature of contextual links will also change depending on the content of the site. A governmental website serving citizens may have contextual links pointing to self-service offers, whereas an online sales outlet may have contextual links pointing to related products under labels like “Users who bought this also bought…” or variations thereof.

The creator will have to somehow determine where to put which contextual labels in or around the text, and they need to assign labelled index terms to all the material in a system in order to determine relevancy to each other (Morville & Rosenfeld, 2006, p. 127). The possibilities of contextual systems have become, if not easier then, more developed over the years, and where indexing labels used to be assigned only in the header of content, hidden from the user, it is now possible to establish context and relevancy in many more ways.

One of these ways is the previously mentioned use of recommender systems where admins, moderators or users of a system can tag content with relevant keywords. After those keywords have been established as labels, the act of establishing relevancy to other labels like them is a fairly trivial computing algorithm that can be done without further input (Gedikli, 2012, pp. 69-70, 89).

Closing thoughts on Information Architecture

This concludes the chapter on the fundamentals of information architecture in information systems. We have looked at three of the four systems of information architecture: organisation, labelling and navigation. Left out is the fourth system, the search system, as this system is not terrible relevant to the topics of this thesis, it is not as closely tied in with the three other systems and it is not as well supported by the theories of Wittgenstein and Austin in relation to categorisation.

I would also argue that even if we were to consider the functionalities of the search system, the workings of such a system would be explainable by most of the theories on proper labelling, navigation and most of all organisation. Most of the theories on actual search systems is based around thoughts on search algorithm, controlled dictionaries and database retrieval. The other part of the search system is showing the results to the users in an adequate way, which has more to do with labelling and organising than the actual inner workings of a search system itself. In short, it is simply beyond the scope of this thesis, as we are not nearly as concerned with how the technical aspects of a given information system functions but rather how the users perceive this system and interact with it directly.

On account of the other three systems, we have determined that there are several different ways of organising content in an information system and that each approach has its own strengths and weaknesses. We have also determined that there are multiple ways of setting up navigation in an information system, and that some of these approaches are better suited to certain types of labelling than others.

The following chapter will be focused on the art of *persuasion* and how it is utilised in the context of a virtual system.

3.2 Persuasion

In the following chapter, I will look at some of the concepts surrounding the art of persuasion. This includes a brief description of what persuasion actually is, how it has been used historically, how it can be used with regards to technology, and lastly how it relates to the field of information architecture.

In comparison to the two other fields utilised in this thesis, i.e. information architecture and pervasiveness, persuasion is very, very old, and has roots going back to ancient Greece. I will not be spending a terrible amount of time going over these roots, but the main concepts established back then are still important in some aspects of how modern persuasion works.

Rhetoric and the Aptum Model

Looking way back to about 2,500 years ago the ancient Greeks thoroughly enjoyed public speakings and debates, and even though there were no scientists or researchers in the same sense back then as we have now, there where philosophers that questioned the world around them and why things were the way they were.

One of these philosophers was the great Aristotle. He took an interest in these public debates and wanted to know more about the dynamics of the arguments themselves rather than the actual contents of them. He worked on the subject for some time and then finally announced that there were three different parts of an argument with each their own characteristics. *Pathos*, used to describe when speakers were appealing to the credibility of themselves rather than their argument, e*thos*, used to describe when speakers were talking to the emotions and feelings of the listeners rather than their intellect, and finally, *logos*, used to describe using the logical argument for a cause in itself. Aristotle would refer to these as the artistic proofs (Aristotle, 2001, p. 4). In modern day terminology, we refer to them as persuasive appeals. All three were needed in order to *persuade* someone.

Later on, these ideas of dissecting an argument into parts was developed further by the ancient Roman Cicero. Rather than three artistic proofs, Cicero developed the concept of *aptum*. This is an umbrella term used to describe the five different elements of an argument: *orator*, the sender, *scena*, the receiver, *res*, the message itself, *situatio*, the situation and *verba*, the style of the argument (Cicero, 1942).

None of this is terribly relevant to a modern approach to persuasion, until we start considering more contemporary thoughts on the subject and how it relates to design and technology. One such train of thought has been developed by Scandinavian researchers into the so-called *aptum model*. See fig. 1.

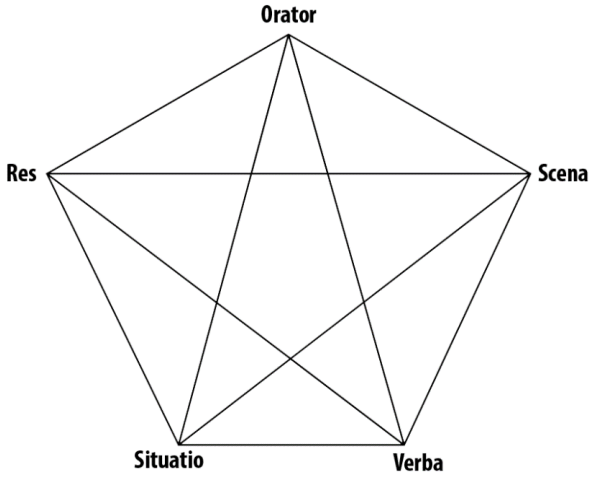

Fig. 1: The aptum model (Hasle & Christensen, 2007).

The aptum model is an attempt to show how the relationship between the five elements of a persuasive argument is completely co-dependent on each other in order for the argument to be successful. All parts are equally important, and if just one fails then the whole argument fails with in. The goal of the model is to have a creator of some sort of persuasive content consider all possible angles of their argument before presenting it. In persuasive design terms this means that an in-depth analysis of all the persuasive components of a design have to be evaluated and adjusted to both the medium, the receiver, etc., if it is to have any impact (Hasle & Christensen, 2007).

Persuasive Technology

When we dwell deeper down in the subject of this thesis, we move from the broad field of persuasive design into the more specialised field of persuasive technology. Persuasive technology is, like information architecture, a fairly new field, but in contrast to information architecture, persuasive technology has roots going back thousands of years to the traditional field of persuasion. This means that it is a fairly well established field even if still young and one of the pioneers of that field is B.J. Fogg.

Fogg practically invented persuasive technology as we know it today by coining the term *captology* to describe the overlap where persuasion meets technology. Persuasive technology is the art of employing persuasive tools through technological systems in order to influence the users of those systems to behave in a specifically desired way. This can be done by influencing users to change their attitude or behaviour to something else through technological means (Fogg, 2002, p. 15). In a sense this a way of translating ancient persuasion into a modern setting. In traditional persuasion, the sender of a message would attempt to influence the thinking and doings of someone by speaking to them directly, and in the modern understanding the sender tries to do the exact same thing through specific choices in layout, wording, branding, etc. in a virtual system. In addition, just like in traditional persuasion the goal of the sender should never be to coerce or deceive the receiver, as we are then no longer talking about persuasion (Fogg, 2002, pp. 15, 213).

Even though Fogg presented several ideas on persuasive technology in his 2002 book *Persuasive Technology: Using Computers to Change What We Think and Do*, I will only be presenting some of them here. Both because Fogg has devoted a lot of energy to precisely define the word captology and what that means, and also because he dedicates a large portion of that energy to justify how persuasive technology, when done right, is completely ethical. For the purposes of this thesis, and because I have the luxury of being able to look at his work in hindsight, I will quickly establish that yes, captology does indeed exist, even if we mostly refer to it as simply persuasive technology today, and no, there is nothing unethical about utilising the tools of the field as long as the sender is considerate of the aptum model for his argument and does not directly try to cheat or deceive the recipient. With that in mind, let us look at some of the tools of persuasive technology we can utilise in a virtual system. Especially the ones that are online on the World Wide Web.

Web Credibility

The most important thing about establishing a persuasive technology in any form, and Fogg is very adamant about this, it to establish a credibility in the sender. Credibility can be established in many different forms, but with so many pitfalls on the internet of scammers, spammers and hackers, one needs to be perceived as a reputable sender of a trustworthy message for anyone to take it seriously. Fogg mentions four specific types of credibility that one can use to heighten such a perception: *presumed*, *reputed*, *surface* and *earned* (Fogg, 2002, p. 163). All four types have different means of being established, and all four types have several different ways of failing. They all share one common denominator though that if one fails the entire message will quickly be discarded by the users of the system.

Presumed credibility is earned through the general assumptions that a user can make about a specific website. This means everything that the user immediately discovers when they first visit a website (Fogg, 2002, p. 163). Does the URL of the website look fishy, or is it a governmental agency with a .gov address? Is the website an official outlet for a band, or is it a fanpage made by amateurs? In either case, the user will have some sort of pre-conceived notion of what the website is and how credible it is. These little things all play together to create a bigger picture of what a professional website should look like, and the creator should definitely think about such prejudices when building one.

Another point of interest in presumed credibility is the fact that users are not stupid, and they should not be treated as such. If you oversell your website, the users will know. So even when it might seem like brutal honesty will not put you in the best light, you should still strive towards honesty rather than deception. It is also worth noting that if a creator lies or otherwise misleads the users of a website, we are no longer dealing with persuasive technology but rather coercion, which is an entirely different field (Fogg, 2002, p. 164).

Surface credibility is closely tied to presumed credibility, but where presumed credibility has more to do with the owner of a website and their personal level of credibility, the surface credibility is determined completely by the functionality and design of the website itself (Fogg, 2002, p. 167). If the creator wants to raise their surface credibility they should make sure that their website not only looks and *feels* professional, but also that it responds quickly and accurately to what the users are attempting to do with it. This means that the creator should attempt to stick to one consistent style through the website, remove dead links from the navigation system, make sure the news section is either updated regularly or remove it completely. Creators should also consider that they might send an unwanted message with having certain types of ads on their website that collide with the values or products of their own (Fogg, 2002, p. 168).

This is definitely an area where users have become more aware as the World Wide Web has grown and evolved over the years. Gone are the days where just throwing some random images and text in a HTML document and adding a news ticker that is being updated bi-yearly. Users expect more of a modern, dynamic and living website.

Reputed creditability is the credibility earned through having a reputation of being trustworthy and credible from outside sources. These can come in many shapes and forms, but one way to attain this is by displaying awards or partnerships with other entities on your website that the users might already know of (Fogg, 2002, p. 165). An example of this would be the Microsoft Partner Network where resellers and service centres that Microsoft has deemed reputable will be awarded some sort of badge to signify their level of partnership. If visitors to the website then see this badge they will know that Microsoft has at least given the owner of the website some sort of credit as to their trustworthiness (Microsoft Corporation, 2014c). At the same time though, website creators should not necessarily flash any and all endorsements as badges of honour. The creator may want to consider twice before putting up endorsements from, for instance, political or religious groups as these might clash with some of the user base (Fogg, 2002, p. 165).

Website creators can also earned reputed credibility by having previous users recommending potential new users to use the website. This can be done either by old-fashioned word of mouth, but it can also be promoted through more modern means like testimonials from users displayed on the website or online aggregate review sites, though the latter is mostly out of the control of an ordinary website creator. One such example would be Trustpilot.com that collects user reviews of almost any available website out there and displays them for the rest of the world to see. They also let businesses display high-ranking scores with an honorary badge (Trustpilot, 2014).

Earned credibility is the final and by far most difficult type of credibility to attain. It is, however, also what Fogg refers to as the "gold standard" in web credibility, because once it is incredibly powerful once achieved. In the case of all the three other types of web credibility the website creator will have some sort of way to influence their standing among their potential users. With earned credibility though, the only way to be successful is to treat users to such a good experience that they will wish to return again later (Fogg, 2002, pp. 170-171).

Fogg aimed his book mostly at businesses when he wrote it, but really, earned credibility is the same for all types of websites. Even ones where users never have to spend a dime. The fact of the matter is that if a user has decided to visit a website, the only way that user is ever revisiting it is if they have a good experience on there. This means that just actually selling a product that the user is satisfied with might not be enough. The website creator will have to foresee as many of the needs the user might want before the user realises that they actually have those needs. This can mean more, or less, communication from the website, more customisation options for each individual user, or something completely else that may be only relevant to the functions of that one specific website (Fogg, 2002, p. 172). The better the creator is at anticipating these needs, the better the experience the user will have and the greater the chance that they return.

Notoriously keeping track of all these different types of web credibility is not necessarily the way of going about building a website. However, it does offer the creator a set of things to be aware of to promote usage of their website and happier users.

Persuasive Technology Tools

Aside from establishing that credibility is the most important factor of generating credibility in the online medium, Fogg also dedicated a large portion of his efforts to explaining exactly how some tools of persuasive technology can be used to influence users. When Fogg wrote his book, it was mostly aimed at businesses and most of the material in the book is not specifically directed at the World Wide Web but rather at computers and information systems in general (Fogg, 2002, p. 32).

This thesis is directed at an online presence, and the parts of Fogg's theories and ideas that I have cherry-picked are the ones that best support and promote that. That being in mind, the following is a selection of some of the persuasive technology tools that Fogg researched and that I have found to be relevant to the problem of this thesis. I will be presenting Fogg's ideas on *simplifying*, *guiding* and finally *customisation*.

The first persuasive technology tool that I will be looking at is that of simplifying systems. Fogg calls this *reduction technology*. The main idea of the tool is that the simpler a task is for a user the more likely the user is to perform that task (Fogg, 2002, p. 33).

If a task is too complex for a user the likelihood of that user abandoning the task rises. Therefore, Fogg suggests that by employing a reduction strategy to one's technology, you have a higher success rate of users actually completing the task. Fogg uses the example of Amazon's one-click shopping where users are able to buy a product off of the current product page with, literally, one single click. This is a brilliant example of reduction technology, because there is absolutely no chance of the user changing their mind in the midst of the transaction. In this case, it not only encourages users to buy more products from Amazon, but it also eliminates the user's chance of changing their mind (Fogg, 2002, p. 33).

As mentioned earlier, Fogg's focus was always businesses, but simplifying tasks to make them more accessible to users really goes for all fields. Profit or non-profit. An example of a governmental institution doing this is the Danish parliament completing a digitisation of the communication between the government and the citizens of the country. The change itself was proposed as a way of simplifying communication between the

public sector and ordinary citizens and thus creating better and more precise communication (Danish Agency for Digitisation, 2014). Also, before actually implementing the mandatory change to digital mail for all citizens the Danish Agency for Digitisation went through a large internal and public campaign to make the systems easier and simpler for the influx of users (Danish Agency for Digitisation, 2013).

The second persuasive technology tool is that of guided persuasion. Fogg has dubbed this tool *tunnelling technology*, and in short this means that a user is more likely to start, continue and complete an action if they are guided through it (Fogg, 2002, p. 34).

The level of guiding in a computer system can vary widely, and different levels of guidance are needed for different tasks. The simplest of guidance could be, for instance, just an arrow pointing the user towards a specific button on a website, whereas the complexity level goes all the way up to setup wizards that guide users through an entire installation process of a piece of software. Fogg notes that not only is the tunnelling of users through a specific set of goals persuasive technology in itself, however, the tunnelling may offer more options for further persuasive technology too (Fogg, 2002, p. 36). Imagine that a website selling musical equipment has a guide for its users to create user profiles. This website could offer different kinds of equipment for sale to the users during the guide and thus act as persuasive technology within the tunnelling process itself.

The last persuasive technology tool is that of customisation. Fogg refers to this as *tailoring technology*. This tool is the most self-explanatory, as customisation for users make users more likely to use and return to a system later (Fogg, 2002, p. 37).

There are several different ways that a computer system can be tailored to a specific user, or at least a specific user group. On one side, the creator of the computer system can set up customisation options for specific users using either already established data on these users or by collecting data about them using tools like geolocation. On the other side, the users themselves can be offered customisation options that allow them to change the look, feel and functionality of a computer system (Fogg, 2002, pp. 38, 40). Users will, in general, be happy about customisation options, but of course it is important to maintain a default setting in a system that will serve all users adequately without compromising usability.

This has been a selection of some of the theories that Fogg presented back in 2002. Next, I will attempt to show how persuasion can play a role in information architecture.

Persuasion and Information Architecture

Not a lot of research has been done in the interconnecting field between information architecture and persuasion. However, Aalborg University's own professor Marianne Lykke wrote an article in 2009 on the subject. Lykke wanted to establish a link between the organisation and search systems in information architecture and persuasive design principles. Even if Lykke dedicated the article to persuasive design, she was talking specifically about websites, meaning that her research is transferable to persuasive technology as it is discussed in this thesis.

It is important to mention that Lykke based her article off of a single case study. Even considering this, the ideas she presented are still relevant to the field in general, but unlike Fogg's book on persuasive technology, Lykke's article is backed more by ideas rather than empirically gathered statistic. The case was a redesign of the Danish website Startvækst.dk, a website dedicated to helping entrepreneurs grow and expand their businesses, and Lykke's goal was to redesign the website in a way that help the users of it better reach this goal (Lykke, 2009).

Lykke divided her findings into two parts, one focusing on the organisation system of the website and one focusing on the search system of the website. However, as previously discussed, this thesis will not be dealing with search systems, and therefore the following is an account of Lykke's finding on bettering information retrieval through improving organisation systems. Lykke examined three different persuasive tools to enhance this: *suggestions*, *reduction* and *social tagging*.

Lykke found that suggestions, used to categorise how content relates to each other, can help raise findability for users. Lykke specifically advocates for the use of contextual links, in that they let users travel quickly between related content, inside the text of websites. She also mentions how relevant information architecture labels of related content organised in some form around the content that the user is currently viewing can achieve this in a more ordered fashion (Lykke, 2009). This coincides exactly with Morville and Rosenfeld's views on contextual navigation for information architecture, as well as their stance on using relevant labels in contextual links and indexing terms (Morville & Rosenfeld, 2006, pp. 88, 95-97, 126-127).

Information retrieval can also be enhanced by means of reduction in the organisation system. The basic idea is to eliminate complexity to the point where it will keep from scaring users away from doing certain desired actions. Lykke finds the best way to do this is by eliminating irrelevant information from the viewing field of whatever content a user is currently visiting, and also by grouping options related to each other closely together (Lykke, 2009). This works very well with Fogg's ideas on using reduction technology on a system to make complex tasks as simple as possible, and also his views on using tunnelling to help users complete advanced tasks (Fogg, 2002, pp. 33-34).

The final change Lykke recommends on the organisation system is to employ social tagging when organising an information system. Lykke finds that social tagging of content helps create relevant bonds between different pieces of content, again just like Morville and Rosenfeld's findings on labelling indexing terms (Morville & Rosenfeld, 2006, pp. 95-97). Lykke admits that social tagging has inherit problems in that it needs moderation by the website creators, and that users do not always act in the desired way when given free rein to tag information (Lykke, 2009). I will personally add to this that tagging does not necessarily need to be done socially by the users but can instead be done in a moderated fashion by website contributors or administrators in the first place.

Lykke offers a view on the bond between persuasion and information architecture that can otherwise be difficult to put into words, and her article helps us understand how this bond functions in the bigger picture of this thesis.

Closing thoughts on Persuasion

This concludes the chapter on the theories of persuasion and persuasive technology. We have examined how to establish web credibility in an information system, we have established a set of three a persuasive technology tools that we can utilise to heighten the level of persuasiveness, and we have seen how persuasion interoperates in the context of information architecture.

We have determined that there is a difference between persuasive technology and coercive technology, and that we should strive towards honesty and openness in system to have our users behave in a specific way rather than trying to cheat them into doing what we want.

We have also established that there is a strong link between how convincing and credible a system is, and how well designed it is from an information architectural standpoint.

The following chapter is the final chapter of the theory part of this thesis. In it we will be looking at how pervasiveness works in information systems, and how that translates to information architecture in general. We will try to develop a set of tools of pervasiveness that allow us to create a stronger information architecture and better usability in an information system.

3.3 Pervasiveness

The term *pervasiveness,* when used in a technological context, is almost an umbrella term that can cover anything from hardware and software to desktop computing and mobile devices. Depending on which field it is applied to, the term has many different connotations. In this thesis, we will be looking at how pervasiveness works within one specific information system rather than across several different systems like a website, mobile app and a physical store.

To do so we will reflect on a book by Andrea Resmini and Luca Rosati published in 2011 called *Pervasive Information Architecture: Designing Cross-Channel User Experiences*. Even if the expression "cross-channel" is in the title of the book, and that the book was written to explain how a user experience can travel through several different outlets, that does not mean that it is not applicable to single systems as well. Resmini and Rosati state so themselves in the introduction to the book, and it makes sense that for one to have a consistent and pervasive cross-channel user experience, one must first achieve that for the individual isolated systems (Resmini & Rosati, 2011, pp. xv-xvi).

Resmini and Rosati's book is not a handbook on how to explicitly create a pervasive information architecture, but it is a collection of a large amount of resources that they have gathered to introduce some ideas and concepts into the information architecture design process of systems. The following is a small selection of some of these concepts that are relevant to this thesis for singular systems.

Creating a Safe Place

When we attempt to navigate in an unfamiliar place, we have different tools that can help us find our way. It could be a map and a compass, a GPS receiver or simply the stars in a night sky. Either way we need something other than just our gut instinct to help us around. Resmini and Rosati refer to this as *way finding*, and it attempts to describe how people do this in the real world (Resmini & Rosati, 2011, pp. 71-72).

When we move this process into cyberspace, the tools will obviously change but the general idea of the process itself actually does not. If we treat the issue as a metaphor, the streets of the real world become hyperlinks in virtual space, cul-de-sacs become dead hyperlinks, and the map becomes a sitemap or a menu. Either way we look at it we have to make users feel more *at home* if we want them to succeed in using our system (Resmini & Rosati, 2011, p. 75). The more at home a user feels in a system, the more likely they are to appreciate using it and continue doing so.

This is obviously difficult to achieve for users in a system that they have never used before, but this is where pervasive tools come in to help the user adjust to the system and start to feel at home. Resmini and Rosati use Facebook as an example of how users that do not necessarily feel at home in the system, have a sense of security and familiarity put upon them by having their friends all be on there and see pictures of the users themselves and the people around them (Resmini & Rosati, 2011, p. 76).

This creates a sense of a *safe space* for the user, where familiarity shines through the complexity. If the website creator can make a user feel at home in the context of a website then the users are more likely to come back (Resmini & Rosati, 2011, pp. 77-78).

This is an interesting point, because it coincides with Morville and Rosenfeld's ideas on using metaphors in organisation schemes to make inexperienced users feel more secure in an information system, and also their ideas on using iconic labels to represent something that may otherwise seem to be a complex option or menu button (Morville & Rosenfeld, 2006, pp. 66, 97-98).

It also intertwines really well with Fogg's ideas on establishing web credibility. If a new information system seems familiar to the user and is on a trusted domain, the presumed and surface credibility of the system rises. In the example of Facebook used by Resmini and Rosati, the reputed credibility implicitly rises for Facebook, because the friends of the new user are already on there and actively use the website (Fogg, 2002, pp. 163-165, 168).

Furthermore, Fogg's persuasive technology tool of tunnelling comes into play, as having guides and helping hands guide users through systems make them feel safer and more at ease with the system . This, translated to pervasiveness, will make the user feel at home in the system (Fogg, 2002, p. 36).

Overall, security through familiarity, help and a clear context are important to establish a safe haven where users are not afraid to experiment.

Classification and Consistency

When discussing grouping items together in relation to pervasiveness, Resmini and Rosati discuss the term *classification*. Meaning, we have to classify what certain objects are in order to present them in a desirable manner to the users. They actually use some of the theories on categorisation by Lakoff that I have explained earlier in this thesis to describe how different items in a system can have either a metaphorical or metonymies relationship to each other (Resmini & Rosati, 2011, pp. 100-101; Lakoff, 1987, pp. 19-20, 77-78).

Resmini and Rosati suggest using classification of items in order to stay consistent within the context of one's information system. Both in the sense that if two things are closely related, grouped in the same category in categorisation terms, they should always be grouped together and be displayed close to each other in the information system (Resmini & Rosati, 2011, pp. 105-106).

This means that, just like categorisation, consistency is contextual in the sense that one needs to consider the context of the whole information system in order to be pervasive. The sender, the receiver, the medium, and so on (Resmini & Rosati, 2011, p. 107). This is the same main idea as the aptum model of persuasion, where the sender of a message has to consider all aspects of their message before sending it (Hasle & Christensen, 2007). In information architecture terms, this means that pervasive information architecture is built by knowing one's audience, their abilities and what they know.

Concerning classification, Resmini and Rosati tell us to be consistent with top-level categories of content having the same granularity and always be easily accessible, where sub-level categories are more forgiving and can be contextual (Resmini & Rosati, 2011, p. 108). This translates to having consistent and omnipresent global navigation in actual information architectural terms, with local and contextual menus being more loosely defined and dynamic, exactly like Morville and Rosenfeld suggested about navigation systems when building a website (Morville & Rosenfeld, 2006, pp. 124-127).

Simplicity and Reduction

Resmini and Rosati explain the art of *reduction* in an information system a bit differently than we have seen before. Their idea is that complexity is not in itself a bad thing, but the organisation of that complexity can be disastrous if not done correctly (Resmini & Rosati, 2011, p. 148). They argue that users do not mind having a big array of options available to them, so long as those are grouped together in a meaningful fashion.

This might seem like it is contrary to what Fogg stated about needing to enforce simplicity in a virtual system for the users to be comfortable in using it (Fogg, 2002, p. 33). However, the two theories are actually two sides of the same coin.

Resmini and Rosati argue that complexity is good, because it offers lots of choices to the user. Nevertheless, they also argue that those choices should be grouped meaningfully together and only be presented in a way that is contextually relevant to the user (Resmini & Rosati, 2011, p. 159). The entire point of Fogg's persuasive tool of reduction is exactly the same. Resmini and Rosati advocate utilising customisation for users to only present them with the choices that are relevant to them and thus reducing the complexity for the individual user. Fogg wants to do the exact same thing, he just does so in other words. He suggests using customisation and guiding as a persuasive tool to make users feel more comfortable with a system (Fogg, 2002, pp. 36-37). Lykke also did the same when she wanted to apply persuasive design to a website redesign suggesting reduction, not by means of eliminating content, but by displaying only relevant and contextual content to users (Lykke, 2009).

Of course, Fogg and Lykke are both speaking from the point of persuasiveness rather than pervasiveness. However, it seems clear that when Resmini and Rosati want to achieve better usability in a system they would employ persuasive tools, maybe unknowingly, to do so. They would just suggest doing so in a pervasive manner through the system instead of focusing on small specific parts.

Closing thoughts on Pervasiveness

Looking over the theories and tools of pervasiveness, it seems like there is a big overlap between that and persuasive technology. Since we have already established that persuasive technology is deeply ingrained in information architecture, the three fields seem to have more middle ground than it would appear at first glance.

Nonetheless, we have now examined pervasiveness in relation to information architecture, and we have established three things. In order to create a successful information architecture, we need to create a safe place for the user to be in first, then make sure that place is consistent and categorised to the context it is in, and then we know that we have to make the place a simple experience for the users.

This concludes the third and final presentation of different fields of theory applied in this thesis. The following chapter is a further discussion of how we can combine those three fields and utilise them in an effective way in a given information system.

4. Discussion of the Theories

In the previous part, I outlined the theoretical and empirical basis for this thesis. I have presented several different ideas in the fields of information architecture, persuasion and pervasiveness. Now, it is time to discuss what exactly all that data gives us. Which tools does it offer, and what guidelines have we established for building information systems. Once I have presented these findings through this discussion, I will attempt to apply them to the real world information system Podio. This will be done in the next chapter. In other words, this chapter is where I present what the different theories have taught us, what we have learned and what we have discovered. The next chapter is where we put those discoveries into work.

Looking back to the chapter on methodology in this thesis, I decided to apply hermeneutics and the hermeneutic circle to understand the theories presented herein. I have already touched upon how persuasion and pervasiveness both correspond with the core principles of information architecture, but in the following chapter, I will be discussing this overlap further.

In order for me to follow the hermeneutic circle, I have had to constantly keep in mind what I was reading and who the original author was in order for me to put it into a hermeneutic context. That is to say that, in order for me to discover the connections and what the similarities between the three are, I have had to first understand where there differences lay.

I set out to discover a more "whole truth" through applying to the hermeneutic circle. The idea was to close the temporal distance between myself and the theories from the three fields by fusing the horizons between them and me. The goal was to create new knowledge in this process, and it is that new knowledge that I will be presenting here.

4.1 When Persuasion Becomes Pervasive

Examining the material and the theories through this entire process, I have noticed especially one thing. No matter which of the three fields we are discussing, all material regarding these subjects end up in some way or form of being about enhancing the user experience.

The three fields all go about it in their own way, but the end-goal is almost always universally the same. To heighten the usability of some sort of technology or information system to the point where users will want to use it rather than having to be forced to use it. We will leave information architecture out of this for the moment and return to it later, and let us instead discuss the field of persuasion.

It has become clear that even though there are several different schools of thought within the category of persuasion, persuasive technology as developed by Fogg is by far the most relevant to this thesis. It has not exactly been easy to determine this as the field in general seems to be suffering from a certain level of, if not dispute, then disagreement about the definition of terms like persuasive design and which umbrella terms cover which areas. Setting politics aside though, Fogg himself is consistent in his definition of persuasive technology, and having more or less coined the term himself I have no quarrels following his ideas. This has meant that rather than looking at persuasion as a broad discipline I have been able to narrow the field down to persuasive technology and its workings.

So what is persuasive technology then? Having researched the material, persuasive technology is not necessarily so much a strict rule or guidelines, but rather it is a set of ideas on how to persuade users to utilise the desired functions of a system by making those functions as approachable and, indeed, persuasive as possible.

In the context of this thesis, this is exactly what i needed. I want to establish how companies can use certain tools to solve exactly the problem of getting users to do specific things in a given information system. However, the object of the thesis has never been to solely establish what these tools were and employ them in a case setting. This thesis was never focused on the casework as such. So let us discuss pervasiveness for a moment.

In the general definition, for something to be pervasive means that it has spread and exists throughout all parts of something. It is everywhere. Pervasiveness is used in a lot of different contexts in the technology field. Experts talk of everything from pervasiveness in file formats to pervasive multichannel user experiences. What I have been examining in this thesis though, is pervasiveness in individual information systems. In this context, it means that an information system must be pervasive throughout the entire system by being consistently consistent.

Put differently, pervasiveness is a way of determining how an information system is consistent within itself. This may sound a bit odd, but really it makes sense that something like a user interface should stay consistent throughout the entirety of a piece of software, or that a mobile app should be consistent in its functionalities no matter which type of smartphone it is being used on. It then may sound like the end goal for pervasiveness is to just stay consistent, but that is not entirely true.

During my examination of the theories on pervasiveness, I have established that just being consistent is not in itself enough. Consistence does not trump usability, if the consistency is structured poorly from the beginning. Hence, consistency is indeed the goal of pervasiveness, but only in the sense that the underlying structure should be developed well enough that it makes sense to let that structure spread throughout something.

If we are talking about developing an information system, this means two things. First, the creator of that system should primarily aim to make a strong underlying structure that serves each purpose of the system in its own best way. Second, the creator should make that underlying structure strong and versatile enough to be applicable to the entire system without creating inconsistency in how that structure works in certain parts of the system. I will translate this to information architectural terms in a moment.

So what happens when persuasive technology and pervasiveness meet? The goal of persuasive technology is the entice user to do certain actions by enhancing usability for those actions. The goal of pervasiveness is to make a structure for a system that is strong enough to encourage users to use it. Both scientific fields have the same goal, but they have different ways of getting to it.

I propose that we consider persuasive technology to be a way of reaching pervasiveness. In persuasive technology we are trying improve parts of a system to the point where that system has the best possible usability for certain desired actions, and with pervasiveness we try to enhance those very same aspects but in a broader sense to encourage usage of a system. Thus, it seems intuitive to regard minor changes towards pervasiveness as being changes in persuasive technology. My theory is that if you analyse an information system with the intent of making parts of it persuasive to its users enough on a micro scale, you will eventually come to a solution that is strong enough to support a pervasive application throughout the entire information system on a macro scale. Let us consider what this means for information architecture.

4.2 Pervasive Persuasion in Information Architecture

Looking back at the chapter on theory, I have already established several links between the three different fields discussed in this thesis. If we now consider persuasive technology to be an essential part of pervasiveness, then that must mean something for their link to information architecture. In fact, when seen in the context of creating an information system, I not only believe the three influence each other but that the three are somewhat dependent on one another.

If we accept the premise that pervasiveness is persuasive technology applied on a macro scale, then that has a big influence on how we as information architects should design our information architecture. The links between the three fields mean that we cannot only consider traditional information architecture when building information systems, but that we also have to think about what we want our users to do with those systems. In order for us to then achieve that usage, we have to persuade the users by applying persuasive technology in an effective manner to the system. However, the process cannot stop there, because we also have to consider the fact that that persuasive technology has to be applied in a thoughtful way that can support the entire information system, and if we do that correctly then we can not only achieve a persuasive information architecture but in fact a pervasive persuasive information architecture.

None of this is to say that these three fields cannot stand on alone, and they all have their respective merits. Certainly, many of the theories in any of the three fields is exclusive to that specific field, but what I have been attempting to establish in this thesis is the shared relations that they have.

4.3 Enticing Users to Utilise New Information Systems

So what have we learned, then? The entire point of this thesis was to establish how to create a strong information architecture in an information system, and my hypotheses were that I would need persuasion and pervasiveness to do so.

It seems that I was right in my assumptions about that. The next task then is to try to put these findings into perspective by applying them to a real world scenario. I have explained the tools that we have at our disposal, and now it is time to try to put those into practice.

The company Ideaal wanted to entice their users into communicating by means of the Podio system rather than through phone calls, e-mails, instant messaging, etc. In the next chapter, I will try to explain what works and what does not work in Podio concerning persuasive and pervasive information architecture, and after that I will use the tools I have developed during this thesis to propose changes to the system that improves it.

5. The Ideaal Case

In the winter of 2013, I was presented with a potential case by my supervisor Marianne Lykke. She had a prior relationship, stemming from different types of casework, with a small three-man company named Ideaal based in Aalborg. She put me into contact with Christoffer Mørch from the company, who was to act as my main contact.

Mørch explained to me that their company consists of himself and two other partners all of whom where industrial designers. At any given time, they had several different clients ranging from other small companies to much bigger ones. They would usually be contacted to create, if not a final CAD-model then, at least a set of mock-ups and sketches of an industrial design that would solve a specific problem for the client. Ideaal has worked with all sorts of designs ranging from camera mounts to headsets and workstations (Ideaal, 2014).

The three partners had long been communicating with their customers through several traditional channels. They had been using e-mails, phone calls, instant messaging and most other ordinary ways of communication that one could think of. The communicative process in itself was not a huge problem for the way Ideaal did their work, but there were some issues that the partners would like to try to solve.

The partners themselves used Podio for nearly everything they did administratively in the company. Podio allowed them to keep track of contracts, share their calendars, keep personnel and salary information and manage their project work for their clients. The three partners would use it as much as possible, and aside from talking face-to-face with each other, Podio was their number one most important way of communication. One thing Podio that was lacking though, were the customers. They had tried, without much success, to invite clients into their Podio workspaces before, but clients would often end up not using the system or abandoning it after a short while. The clients would then go back to the traditional ways of communicating with the company through e-mail and phone.

This meant that all communication with Ideaal and their clients happened between one contact person in Ideaal and one from the client's offices. This presented a problem in that the responsible Ideaal partner would then, after having communicated with a client, have to go into the Podio system to manually add whatever they had agreed upon with the client to the work log. This was the only way the three partners could keep a written log of any agreements, and it presented double the workload for an otherwise automated task if that communication had simply taken place in the shared Podio workspace to begin with.

The other main issues Ideaal had were that when communication was taking place outside of Podio there would be a lot more waiting around for answers from the other side, and sharing ideas with their clients would seem cumbersome. This was a double-edged sword, as clients would often ask for updates on a project when there were none of value to give, and they would never see the creative process when it was actually taking place, and thus potentially losing the chance of giving valuable input. Since the three partners already knew the versatility of Podio, they contested that bringing the clients into their shared Podio workspaces would be a better solution. This would allow clients to see real-time updates, and offer their insight when needed in a much more dynamic and versatile system than through, for instance, e-mail.

To sum up, Ideaal wanted to include their clients much more in the system that the three partners themselves used for everything. Their hypothesis was that doing so would benefit the creative process between company and client, and that it would help alleviate unnecessary workload for the partners. The problem in doing so was that every former attempt had resulted in the client abandoning the system or at least using it in only a very limited way.

Enter the information architect. My goal, after having established these problem areas with Mørch, was then to try to offer my insights on how Podio should be set up in order for the company to better entice its clients to become users of the system.

The case was originally planned to be one of pure information architecture, where I would analyse and improve the existing information architecture of the Podio system, however, some issues presented itself along the way.

5.1 What is Podio?

Before analysing and redesigning any system, it is important to understand the system. What it is trying to do, which functionalities it offers and what the limitations of the platform are. So what is Podio then? Podio is hard to define, because it is not really like anything else out there. Podio is part CMS, part database, part creative tool, part collaboration arrangement and a whole slew of other parts all mixed into one online package.

Podio themselves define the software as *"an online work platform with a new take on how everyday work gets done"* (Podio, 2014a). However, that does not really elaborately explain what the system actually does. Through my work with the system over time, I have come to know it is an intranet with databases and a social platform. You can think of it as a mix of the Moodle CMS, MySQL and Facebook.com, but even that does not cover the system completely.

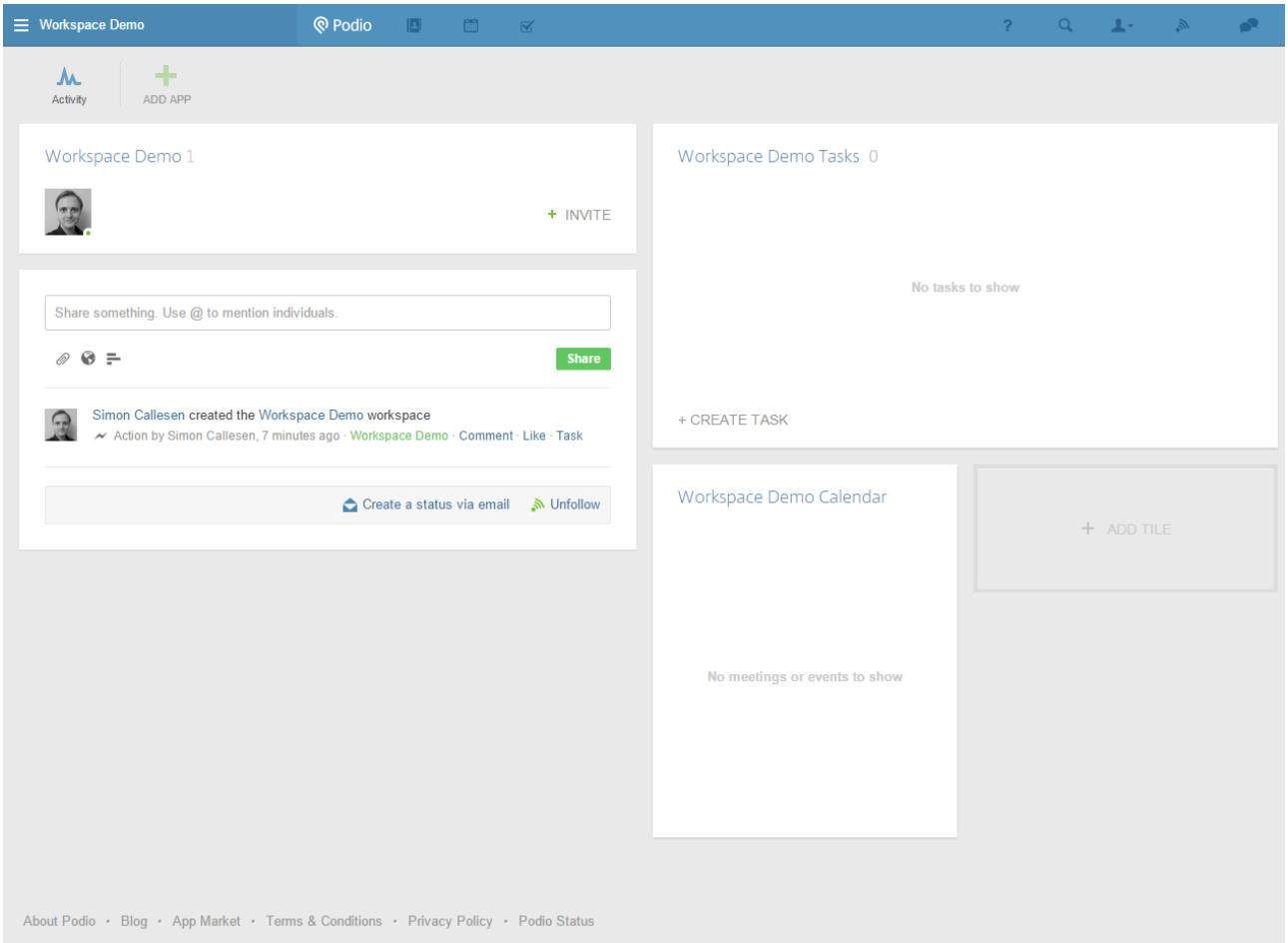

Fig. 2: The main interface of an empty Podio workspace with one user.

So instead of trying to define specifically what Podio is, let us instead look at some of the things it can do. Podio offers a social platform that lets users share different types of workspaces, wherein they can collaborate on all sorts of things. The built-in functionalities of Podio offer a wide range of possibilities for such types of work, but the options are expanded exponentially once you take into account the hundreds of extension apps available for Podio. Most of which are free, just like the system is for up until five users (Podio, 2014a; Podio, 2014b).

Other than that, the user can customize the interface to suit their own individual needs, and there are certainly many possibilities available. However, this is also where the problem with Podio arises. As Podio is a centralised service on Podio's own servers, the default user experience is almost completely dependent on what the creators of Podio think it should be like. This poses a problem.

The original idea of this case was to redesign Podio in such a way that Ideaal could entice their clients into using it for communicating with the company. This has proved challenging, because even though Podio offers plenty of ways to customise the interface, they almost only offer those options directly to the individual users. In this case, Ideaal would be able to dictate what they share with their users, and to some extent which apps the user has available at first glance, but Ideaal would never be able to actually dictate the very first user experience for their clients. In addition, it has turned out that even though Podio is very customisable in the functionalities that is offers, it is not actually possible to change the interface of Podio in such a manner that I had anticipated.

Therefore, instead of using the built in tools of Podio to create a new Podio interface that is more welcoming to Ideaal's clients, the following is an analysis of what Podio currently looks like and how it functions. That will then be followed up by mock-ups of the information architectural changes that I would have liked to see possible rather than those that actually are. That means that I will be proposing a new information architecture for Podio, but that information architecture is, unfortunately, not actually implementable for Ideaal in Podio's current shape.

5.2 Analysis of Podio

In order for users to use Podio the process is, more or less, as with any other website. The user visits Podio.com, logs in with their credentials, and is then presented with their main workspace. See fig. 2. There is no software installation needed on the client's end, and everything should work pretty much right out of the box for anyone across any system on any internet browser. I have been using Google Chrome version 38.0.2125.104 along with the plugin FireShot version 0.98.53 for the screenshots in this thesis, but again, it should look exactly the same with any other setup.

At first glance, the user will notice two things. First, the interface looks suspiciously like that of Facebook or LinkedIn – right down to the blue colour scheme. The second thing that the user notices is that the interface is somewhat simple with a limited amount of options available. The problem is, though, that once a workspace starts rolling with people uploading work, discussing things, adding apps and making updates the interface quickly gets a lot more complex. See fig. 3.

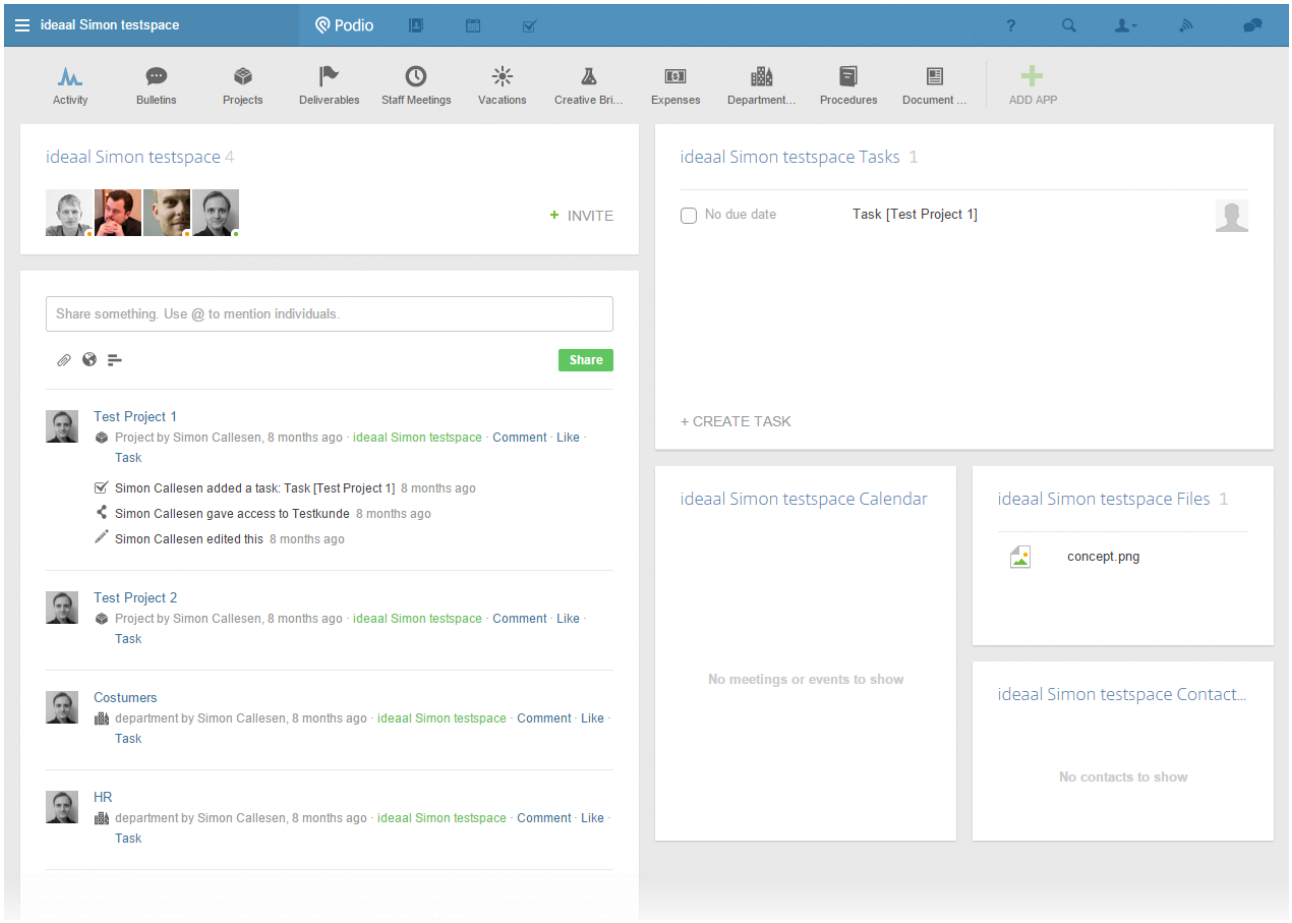

Fig. 3: The main interface of a workspace that has seen some usage by users and had apps added to it.

Since we are working with a case where new users will be incorporated into an already-existing Podio workspace, where the Ideaal partners have already been preparing material and the like for the clients, we need to consider what Podio would look like for a new user being invited into an already existing environment. I have attempted to create a workspace that best illustrates what would be needed for an average client of Ideaal. The workspace has been stripped to the bare minimums as far as apps go, but I have not changed any settings that require actions from the individual user, as this would not be possible in a real-world scenario. The stripped-downed interface is depicted in fig. 4.

I have attempted to create as light of a workspace as possible while still maintaining the functionalities needed by Ideaal. Namely, to be able to set meetings with their clients, discuss deliverables with them and update them on project statuses. This means we are dealing with a workspace with just three Podio apps installed. “Projects”, “Deliverables” and “Meetings”. All of which are available in the default setup of Podio. All comments made on Podio from here on in is based on this specific workspace setup, and the changes that I will be proposing later will also be based on the possibilities and limitations of it. See fig. 4 which is a screenshot of the main interface and thus the first thing a new user invited by Ideaal into Podio would see. Notice that the bottom has been cut out of the screenshot, but since users would rarely start by scrolling down through the entire history, it is not terribly relevant for now. There is a menu on the very bottom of the page, though, that users would have to scroll through the entire history to get to, but I will return to this menu later.

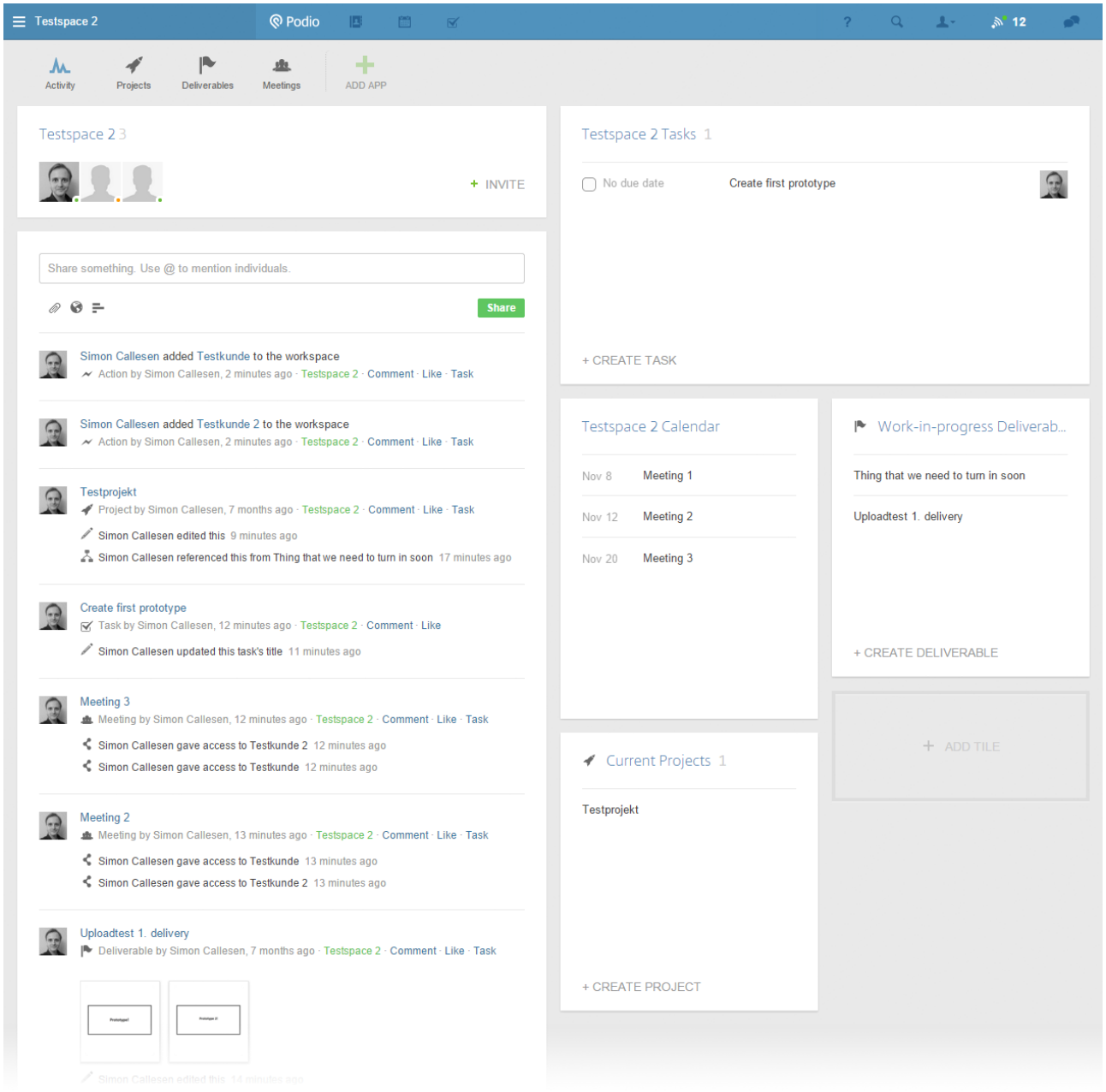

Fig. 4: The main interface of the stripped-down workspace.

Now that we have established what Podio would look like to a new user, let us try to analyse the interface from the three different fields of study that I examined the chapter on theory. We will be looking at the information architecture, the persuasive technology and pervasive elements, and how those operate together.

First Contact

As mentioned earlier, the interface does bear a resemblance to the frontpages of both Facebook and LinkedIn. There is probably a reason for this. If we look back at Resmini and Rosati's ideas on creating a safe place for the user, it makes sense that Podio would want to create an inviting and familiar place for their users to share their ideas in. This also goes along well with Morville and Rosenfeld's proposal to present options to the users that are familiar to them to make them more comfortable with a website. With Facebook having 1.32 billion active users each month, and LinkedIn having more than 313 million registered users total, it certainly seems plausible that most of the people invited to use Podio would already have some experience with at least one of the two websites (Facebook Inc., 2014; LinkedIn Corporation, 2014).

If we consider persuasive technology as well, then it also makes sense that Podio would want to establish web credibility from the user's very first contact with the system. The presumed and reputed credibility would have to come through recommendation and explanation of what Podio is by Ideaal to their clients, but the Podio system itself can definitely raise its surface credibility by looking familiar to the user. Without being able to show this in a screenshot, I can also personally attest that Podio reacts really quickly throughout the entire system with no noticeable slowdowns. The process itself of actually getting into the system is also as simple as the user entering their desired password, the e-mail be pre-filled, and pressing OK. The user does not need to use any activation e-mail or jump through any hoops to get in and use the system. Concerning pervasiveness, it is a good thing that the start-up process itself seems to be effective in both simplicity and reduction.

It would then seem like Podio ticks off several boxes for good information architecture, persuasive technology and pervasiveness at the user's first glance. However, there are problematic areas too. Let us dig a bit deeper.

If we start to investigate the labelling and navigation systems of information architecture from a first contact perspective, we start to run in to some issues. Podio uses plenty of headings as labels. There are six boxes with information in them on the main interface. One for the collaborators in the workspace (labelled *Testspace 2* in this case), one for the activity stream (not labelled), one for tasks (labelled *Testspace 2 Tasks*), one for the calendar (labelled *Testspace 2 Calendar*), one for deliverables (labelled *Work-in-Progress Deliverables*) and finally one displaying the projects in the workspace (labelled *Current Projects*).

I do not really see any problems with the labels themselves, aside from the fact that it seems unnecessary to specify that the tasks and calendar are related to "Testspace 2" in the label. This is a result of Podio wanting to have its users be able to distinguish easily between their different workspaces, however, this is just adding on unnecessary information in our case, as the users would never need more than the one workspace Ideaal is sharing with them. I do not see a problem in the activity stream not being labelled, as the contents are fairly self-explanatory, and most users would already be familiar with a setup like this because of the likeness to Facebook and LinkedIn.

What a do see a problem with though, is the fact that there is so much information on there to begin with. Users in our case would not need half the labels on the main interface, and there is no way for Ideaal to disable most of these. Some of the information boxes can be disabled, though. The users can disable some of the other content themselves as well, but the whole point of the case is to not run into the problem of users having to customise things themselves. This is an issue from the perspective of information architecture, because labels should be concise and limited to the ones that are actually needed. It is a problem from a persuasive technology view, because it does not let us utilise reduction as a tool to encourage users to pay

attention to the content we actually want to show them. Finally, it is a problem from a pervasiveness perspective, as we cannot employ simplicity in our setup through reduction, meaning the interface as a whole is cluttered without letting us do anything about it.

Navigating Podio

Once the user has experienced their first contact with Podio, we will want them to move on to using the system for what we actually wanted them to do in it. This means navigating around in Podio. Before establishing an actual navigation system, though, we will have to determine how Podio organises its contents.

Looking back to fig. 4, we see several different types of organisation schemes. The activity stream and the meeting box are both chronological, albeit in different order to each other. This makes sense as the activity stream displays things from the past, so the content gets older and older as the user progresses down the list. The meeting box on the other hand displays things coming up, so the user would want to see the oldest entries at the top, as none of them have happened yet and the "oldest" entry will therefore be the next one happening.

The deliverables box too is chronological, and in this context, that is a good choice. The tasks box is also chronological, but since tasks is a by-product of being enabled per default, I would actually rather that we do away with the box entirely. The same thing goes for current projects that are unnecessary, again, because we do not expect our users to be involved in more than one project.

The main interface uses a hybrid of different organisation schemes, but it is not a problem in itself. The organisation schemes chosen make sense in their own context, and the problem only arises in that the organisation schemes are there in the first place. If we move on to investigating the organisation schemes of the entirety of Podio, we run in to some more serious issues, though.

Podio likes to divide its content by apps. In our case, this is a brilliant solution because the apps we need are one for projects, one for deliverables and one for meetings. That means that we can use a really precise organisation scheme to point to divide just these three things into. Since every app solves its own set of problems, our Podio system is automatically categorised into an ambiguous topical organisation scheme of those three apps and the activity stream. This is also great for the pervasiveness of the system, as no matter what a user clicks they will always be able to travel straight back to one of those four main categories.

However, the issues arise when we start to consider the rest of Podio rather than just our current workspace. It offers massive usability problems that there is no clearly defined line between the Podio interface in general and that of a specific workspace. We actually do not need any further organisation than the one categorisation the content into the three apps and the activity stream, but if we consider the menus for a moment, it becomes clear that when we consider the entire Podio experience for the users the picture becomes a lot muddier.

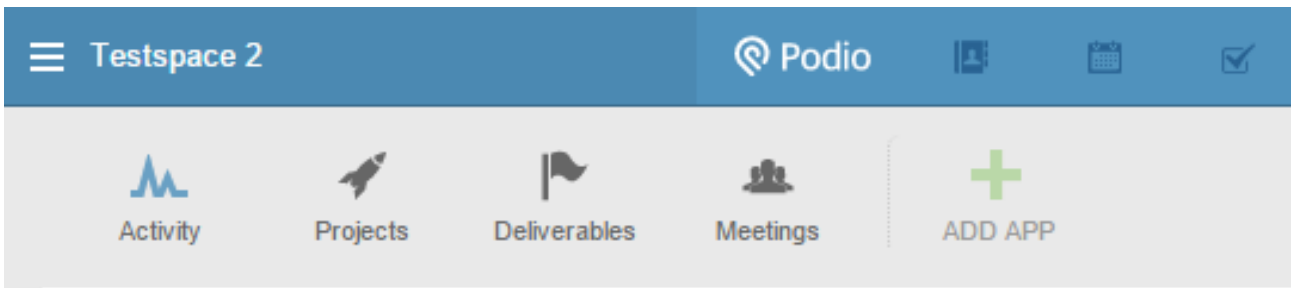

Fig. 5: The three different menus in the top left. The workspace menu can be expanded as shown in fig. 7.

Podio displays no less than five different menus for its users. None of which we can remove and only two of which I can actually justify using in this case.

There are four different menus in the top of the Podio interface. The workspace menu, which can be expanded as shown in fig. 7, the Podio menu to the right of it as seen in fig. 5, the social menu shown in fig. 6, and the app menu directly underneath them all shown in fig. 5. The fifth menu is the bottom menu that is only visible if the user scrolls all the way to the bottom of the activity stream as shown in fig. 8.

Fig. 6: The social menu in the top right of the interface.

There is no clear indication anywhere of which menus do exactly what, and all of the menus, aside from the app menu, are global navigation systems. It does not matter where in the entire Podio system the user travels, all those four menus will always be visible, and the app menu will disappear as soon the user accidentally clicks themselves out of the workspace, and they will have no clear way of returning back to it. This way the only navigation menu that we would actually like to be global is in fact local instead.

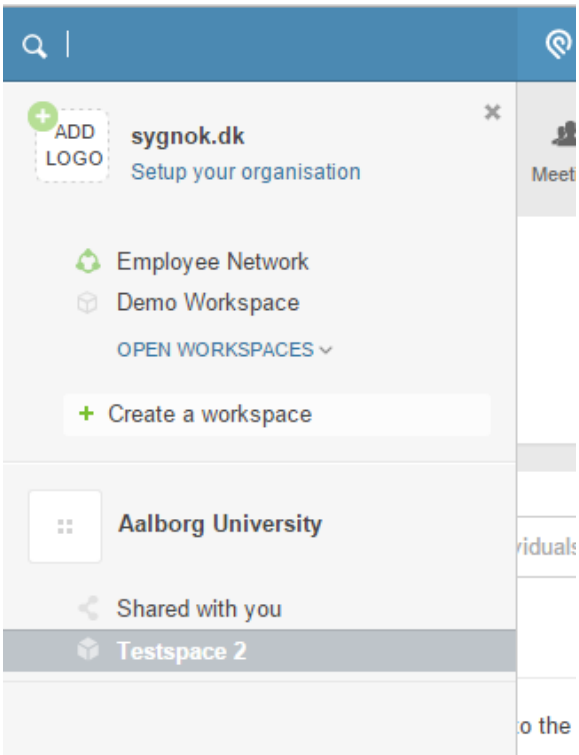

Fig. 7: The workspace menu expanded.

This is a huge issue for the organisation system of Podio, because it is impossible for us to employ local reduction through persuasive technology or system-wide reduction through pervasiveness. The only menus the users will actually ever need in our case are the app menu shown in fig. 5 and possibly the social menu shown in fig. 6, because the latter offers chat support and help. I could excuse the bottom menu shown in fig. 8 as well, since it is on the very bottom of the page and thus does not immediately present itself to the users. I would imagine it also being nice for users to have a way of reading more about what Podio is like the menu offers.

This organisation scheme of having hybrids of all sorts all over Podio greatly damages the usability of the information architecture overall. This is something that is not even customisable for the individual user, which could otherwise be offered as a tool of persuasive technology, this is just the way Podio is built. This might work great for power users who know the ins and outs of the system, but for first-time users having this many options and this level of unnecessary complexity greatly hinders the persuasive and pervasive information architecture. In order for us to reach a truly persuasive pervasive information architecture for Podio we would have to reduce the complexity and amount of clutter greatly, but those options are just not available. It is an inherent problem to the way Podio is constructed.

Podio also does not allow us to create any type of guide for new users, so we cannot utilise tunnelling in any way as otherwise suggested by both Morville, Rosenfeld and Lykke. Podio does pop up with a quick help system when a user enters the system for the first time, but again, this is not localised to what we actually want to show the users but rather the entirety of Podio which is way beyond the scope of our goals and just adds further complexity.

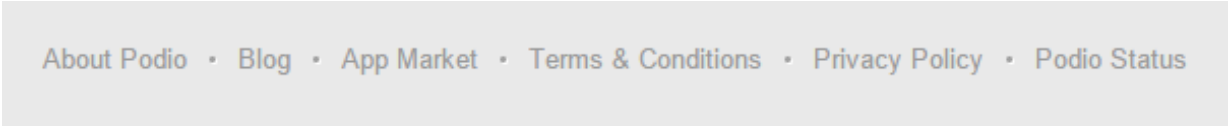

Fig. 8: The bottom menu.

Labelling Information

I have already touched upon how the labelling in Podio works at the first impact of the system, but let us take a closer look at the labelling system in general throughout Podio. Podio uses labelling in all the different contexts mentioned by Morville and Rosenfeld. As previously mentioned, there are several labels used as headers all around the system some work as links either as part of the navigation and some work as contextual links.

For the most part these labels work really well within Podio. I have mentioned the issue with some labels being unnecessarily long (mainly *Calendar* and *Task* on the main page), but other than that the labels in Podio actually work really well. The only labels the users in this case really need are the four different ones from the app menu shown in fig. 5, the labels in the social menu shown in fig. 6, and of course the header and contextual labels spread around the system that do not work as an actual part of the navigation system.

If we start by looking at the app menu, there are only four different labels. They are a combination of headings and icons. As Morville and Rosenfeld showed, this is a good way of covering all bases of both having an icon that is easy to decrypt in itself, but also backing that up with a header that explains the label completely. I do not believe any users would have trouble understanding what *Activity*, *Projects*, *Deliverables* or *Meetings* mean. Even if this was the case though, Podio will let the administrator of a workspace change all app labels to whatever they please. This is not true for the activity label as that is a part of Podio itself rather than the app system. If the user still struggles with understanding the labels, there are mouse-over hints to all of them aside from the activity label. This is a really good thing, because even if the app menu is not global but local to the workspace it is still by far the most important menu in the system for this case.

There is a problem with the way Podio deals with categories, though. Podio treats both the projects and deliverables labels as top-level categories. This is fine for deliverables as several deliverables can be added to a project over time, but projects should not be a top-level category for anything, since we will only be dealing with one project at a time in this case.

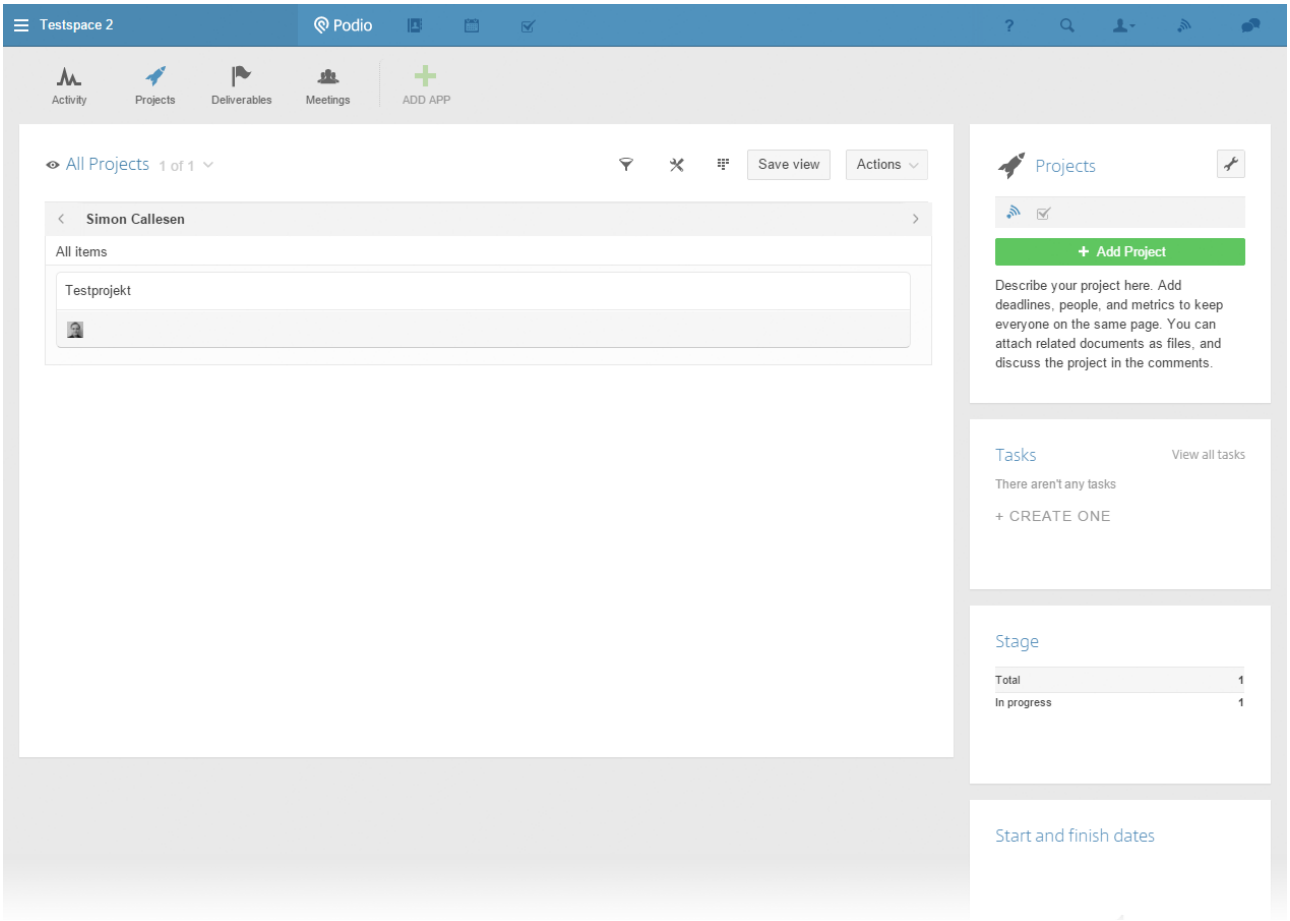

Fig. 9: Clicking the "Projects" label takes the user to a top-level category containing just one project.

Instead of treating projects as an entire top-level category, it would be easier for users for every workspace to just be one project. See fig. 9 for the current layout when entering the category of projects.

Concerning the social menu in top right of the interface from fig. 6, things become a little more unclear. The menu consists solely of icons rather than icons and headers. I do not find this to be a huge problem, though, as the icons are fairly self-explanatory, and the menu in itself is not hugely important to the workings of Podio. The icons used for labels are a question mark to indicate the help section, a magnifying glass to indicate the search system, a silhouette of a man to indicate account details, a radar beacon to indicate notifications and two speech bubbles to indicate chat. Perhaps aside from the radar beacon the labels work really well to explain their functions, and they all seem to be more or less standardised in internet culture, although I do not have any data to back up this claim. Even if all else fails, these icon labels too have mouse-over hints.

I would like to mostly ignore the other menus, as I have already established that I would remove them if possible. However, I feel that the Podio menu in the top left to the right of the workspace menu, as depicted in fig. 5, has issues with its labels that further clarify why it would be a good idea to simply remove the menu. The Podio menu consists of four icon labels, and all of them function as buttons in a navigation menu. The first icon is the Podio logo (this logo includes the word *Podio* in it). On a normal website, the user would expect to be taken back to the frontpage when clicking this. The problem with this label is again the organisation system of the system, as clicking the icon label takes the user to the frontpage for their entire Podio account rather than the current workspace. The user then has no easy way of returning to the workspace.

The contact label is depicted as an address book. I have no quarrels with this, but the address book could easily be migrated to the social menu on the right instead, and in fact, it might make more sense to place it there, as I would categorise contacts as belonging with the other social options like the chat label. The third icon label is the calendar, but clicking this does not take the user to the same calendar as clicking the calendar label on the main page of the workspace does. Clicking the calendar label in the Podio menu takes the user to a different calendar that is tied to the main part of Podio, just like clicking the Podio label in the same menu, and again leaves the user without an easy way to return to the workspace. The problem is the same with the fourth and final label, the tasks label. Clicking this sends the user to an overview of all tasks tied to the main Podio account rather than the tasks linked to the workspace that the tasks label within the workspace does instead. Again, leaving the user with no easy way to come back to the workspace.

Like the navigation system showed us, the labelling system in this menu shows severe issues with the classification and consistency of the pervasive information architecture. And again, the problems are the same as with the navigation system, we cannot utilise reduction through either persuasion or pervasiveness to eliminate the problem.

The other labels within Podio serve their purpose well, though. They mostly work as headers throughout different parts of the system, and the users, or in this case the Ideaal partners, will decide most headers for themselves, for instance when someone starts a new project or when a meeting is arranged. We cannot falter Podio for letting the users decide on their header labels by themselves, and this is a good thing as different user groups will require different labelling system. There are some other contextual labels that mostly do their job well enough, for instance the *CREATE DELIVERABLE* or *CREATE PROJECT* labels on the frontpage that offer easy access to their respective categories, but again, from the perspective of simplicity and reduction it would actually be preferable to not have these labels there in the first place.

Concluding thoughts on Podio

We have looked at several different problems with the current Podio interface. The problems lie not only in what we would consider a good information architecture in itself, but also in persuasive technology for the individual parts. As I have already concluded, when the persuasive technology tools do not work well in an information system, the pervasive information architecture does not work properly either. This seems to be the case with the interface of Podio, because there are certainly issues that would need to be resolved. At least if Podio was to function in a way that would be advantages to Ideaal's clients.

The problems seem to lie mostly within the organisation and navigation systems in Podio, but I have also discovered challenges with the way Podio treats labels. The former is mostly a result of poor pervasiveness of persuasive technology tools, while the latter is mostly due to poor categorisation standards. Some of these issues can be fixed through the ordinary functions of Podio, but unfortunately, most of them cannot.

This then has been the analysis part of the current default layout of Podio. In the next and final part of this case, I will attempt to rectify these issues as best I can through the tools discovered in the theoretical part of this thesis.

5.3 Models for an Improved Podio

Looking at the issues I discovered in my analysis of Podio, it seems clear that the most important problem is that of complexity when welcoming new users into the system. In this case, we wanted to entice Ideaal's clients into not only using a system but also using it actively, and as I have accounted for several times, this requires the information architecture of the system to be both persuasive and pervasive at the very first sight.

This means that the main focus of the redesign that I am about to propose will be in the way Podio first welcomes its new users. In a perfect world, these would all be changes that Ideaal would be able to set up beforehand, but unfortunately, due to the nature of the way Podio operates this is not possible in its current state and likely never fully will be. What I am about to show you is instead a combination of the built-in possibilities in Podio and Photoshop. See fig. 10.

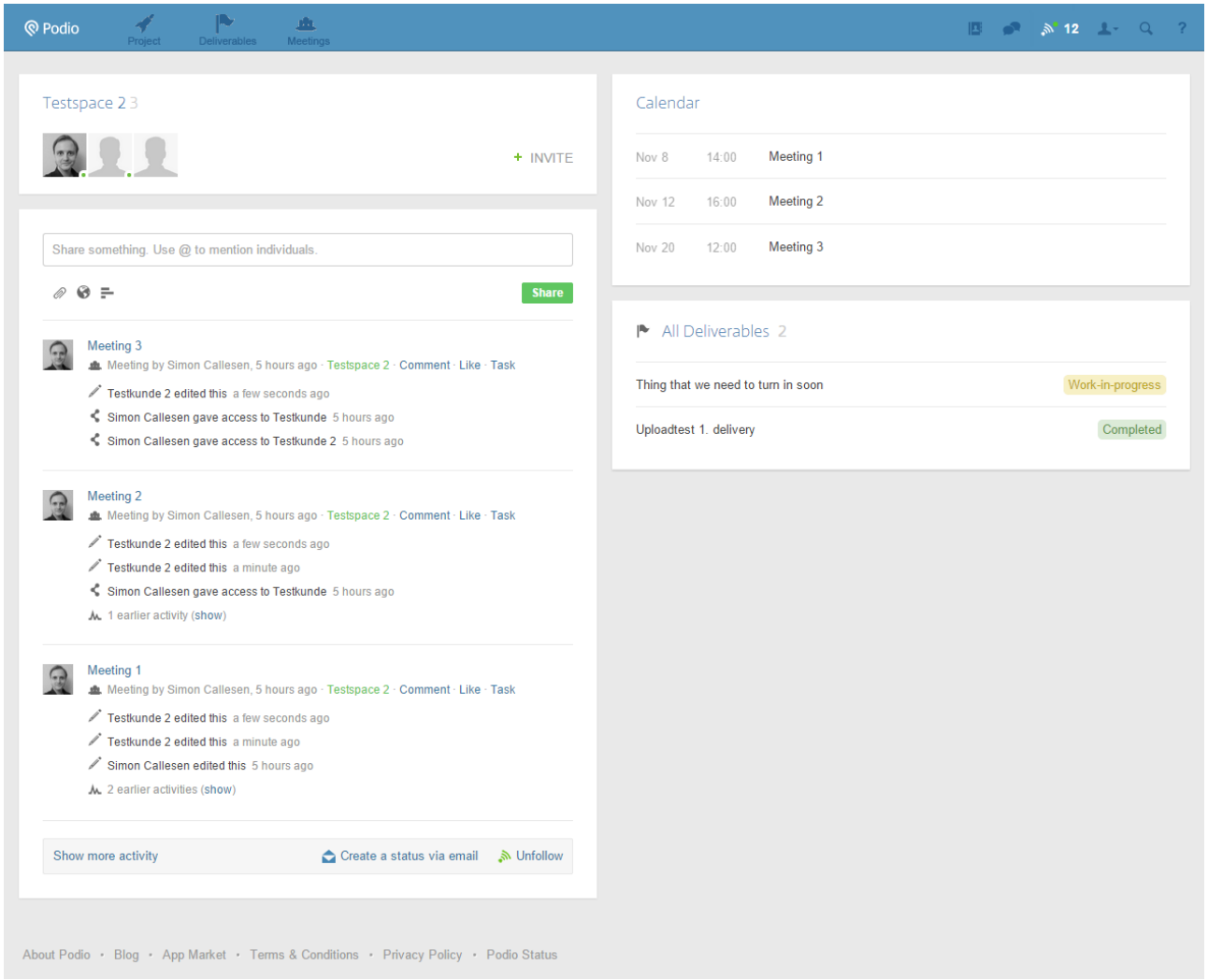

Fig. 10: The new and improved main interface.

The new main interface has had a lot of the clutter and complexity removed that the default setup of Podio exhibited in fig. 4. Nothing of value has been removed seen from the perspective of this case, but it is obvious that functionality has been removed. This is completely in line with both the theories on persuasive technology and pervasiveness, though, as the level of complexity should always be customised to the individual user's needs, and in this case, those needs are very basic.

I have cut down the number of information boxes on the main interface from six to four. The four remaining are the activity stream, the deliverables, the calendar and the collaborators. The latter of which could arguably be removed too. The calendar and deliverable boxes both expand as the project grows. Nothing of value has been lost to the individual users here. The case posed the problem of getting Ideaal's clients to use Podio to communicate with them and share deliverables with them.

I have removed the "outer" layer of Podio completely from this mock-up, and the entire system is now based solely on the single workspace that the user is currently participating in. The collaborators, the activity stream, the deliverables and the calendar is only concerned with this single workspace. The navigation and organisation system of the main interface are much clearer and easier to understand.

Removing all the clutter has obviously greatly enhanced the persuasive technology tools at work in the first impression. It is a good example of how reduction can help users utilise a system and actually want to do so. One could argue to also include a type of guide, but I personally do not find this to be necessary anymore as the interface is much easier to decode. The surface credibility is higher, since the user now has a much better overview of what they are participating in, and the interface has been specifically customised to that user's needs.

The pervasiveness sees improvement through these changes too, since the layout still looks like a familiar safe place, i.e. it still looks like Facebook and LinkedIn, but now with much less clutter and complexity.

Since the entire organisation system of this new and improved Podio has changed, so has the navigation options. As shown in fig. 10, I have reduced the number of menus from five to three, and one of these menus is the very nonintrusive bottom menu. I have chosen to preserve the bottom menu, because it does not interfere with the actual functional parts of the workspace while still keeping a link to the rest of the Podio universe inside the system.

The rest of the navigation system has seen a large revamp, though. See fig. 11. This is the new main menu of the system. This menu will function as a global navigation option wherefrom the user can always go to any desired part of the workspace.

Fig. 11: The new main menu.

The Podio label is still there, but instead of taking the user to the main account outside of the workspace, it is now supposed to take the user back to the activity view for the workspace. This has also meant that I could eliminate the activity label from the original layout. The old *Projects* label has been changed to simply *Project*, and it now no longer takes the user to a top-level category of different projects as shown in fig. 9. It now takes the user directly to the subpage for the current project tied to this specific workspace. See fig. 12 for an example of what such a subpage would look like in the new interface.

The *Deliverables* label still takes the user to the overview of deliverables as before, but this subpage has also been reduced in complexity. See fig. 13. I have removed an entire block of information on the right hand side of the subpage that solely dealt with creating deadlines and uploading deliverables. All of this is needless clutter in this case, as Ideaal would be doing anything related to that. We only need our users to be able to see deliverables and comment on them (which they can do from the individual delivery subpages).

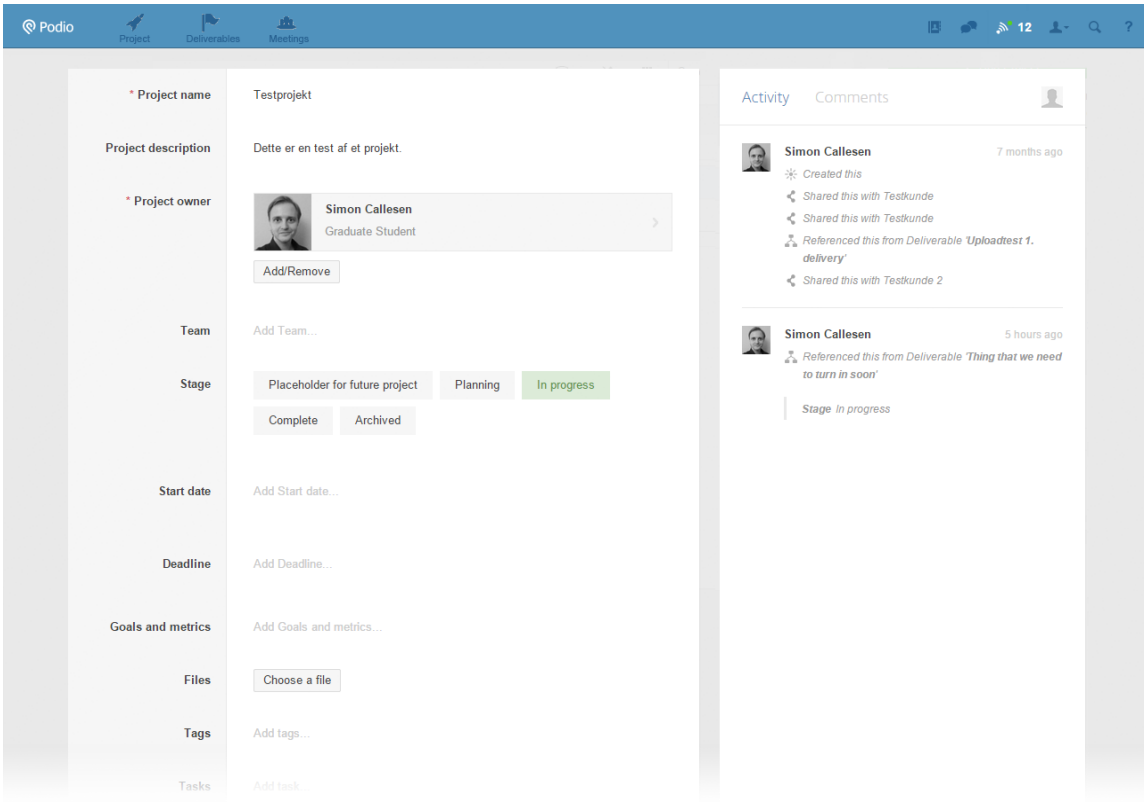

Fig. 12: The new project page that the users are now taken directly to when using the main menu.

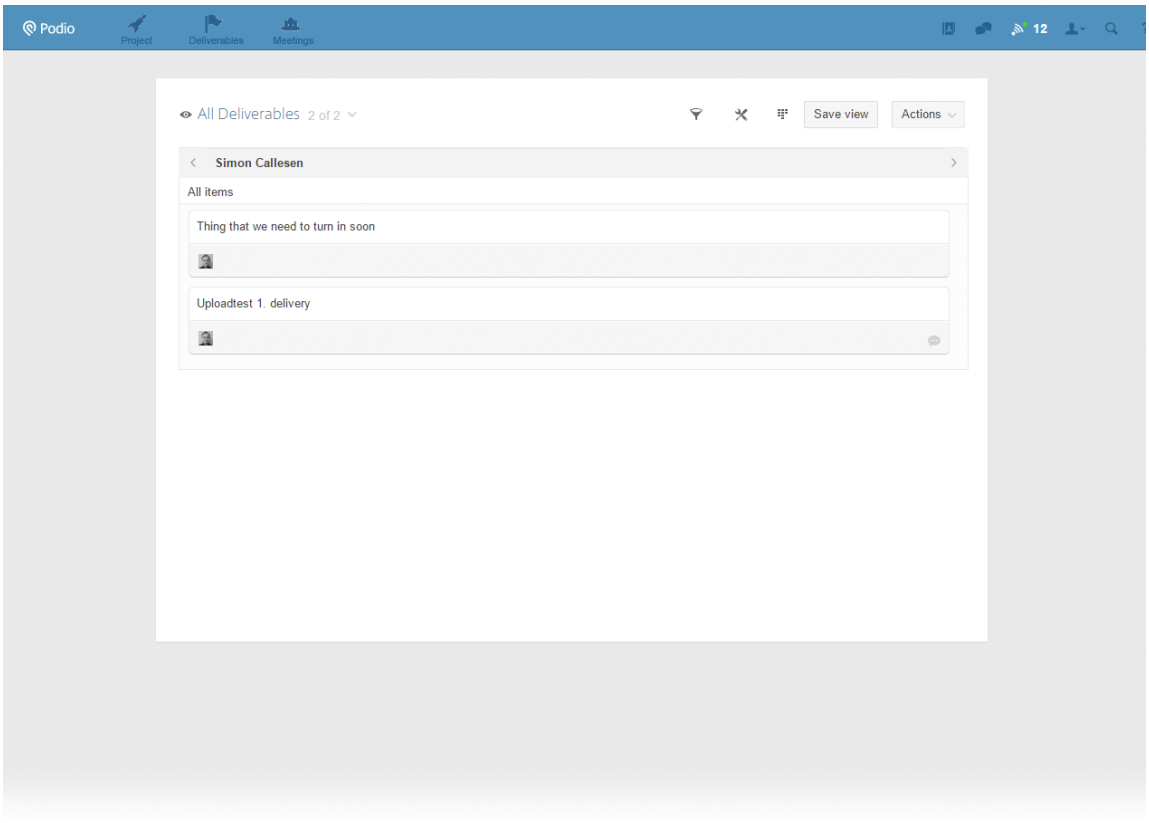

Fig. 13: The new page with an overview of deliverables.

The *Meetings* label is still there, but instead of having the problem of using two different organisation schemes from before, this label will now take the user directly to the calendar for this specific workspace. Just like the other labels. This means that we have done away completely with the old calendar button. It is now no longer needed. I have also removed the old *Tasks* label, as this function is not available to this user group in the new interface. As with everything else unnecessary, it has been removed to promote reduction through persuasive technology and pervasiveness.

The workspaces menu to the left of the old Podio menu has been completely removed in favour of the new menus. It is no longer needed, as the organisation system of the entire system has been improved. The old label to add an app has also been removed, as this function will only be relevant to the Ideaal partners and not their clients.

The old social menu seen in fig. 6 is still there, but it has also seen some slight changes. See fig. 14. The new social menu now also contains the address book label, as it made more sense from a categorisation point of view to group it together with the chat function. The order of the other labels has been changed around a bit to better accommodate ordinary web practices, though I do not have any empirical data to back these changes up, so I will not go into further detail with this.

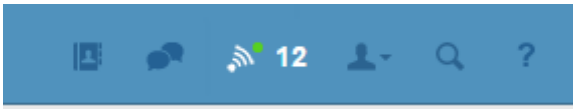

Fig. 14: The new social menu.

5.3 Case Conclusion

Overall, I believe the changes I have made to the information architecture of Podio display a good example of how persuasive technology can be utilised to create a solid pervasive information technology in an isolated system. I have highlighted the faults of the current default set up of Podio, and I have addressed these issues in my new mock-ups without actually changing the look and feel of Podio from the safe place it already was.

As I have already mentioned several times, these mock-ups show only what the interface of Podio ought to look like for a completely new user. I have no intention of changing the way power users like the Ideaal partners operate, as they have shown that they are already very happy with how Podio functions.

Unfortunately, I have been unable to implement most of these changes into an actual Podio workspace because of the restrictions posed by the way the system is built. This is not likely to change drastically in the future, as Podio is a service that runs completely in the cloud on Podio's own servers on proprietary code. Had Podio been open source, and had people been able to run it on their own servers this would have been a completely different story, but sadly, it is not. On the same note, it would have been nice to be able to do some usage cases on the changes that I have made, but since I cannot actually implement them this has not been possible. One way of potentially doing something in this vein would be to try to incorporate participatory design in the process, but again, without actually being able to showcase a working product, the end result would not be of any practical value.

If I actually were able to put my suggested changes into effect, though, it would also be interesting to utilise participatory design to see how users changed their behaviour as the became more comfortable with the system. It would be exciting to see how their usage expanded over time, if at all. For now though, this is where I will leave the Ideaal case, and this then is the conclusion of the casework presented in this thesis. The next and final part of the thesis will be my conclusion on this entire process, and where I will attempt to answer my original research question.

6. Conclusion

In the introduction to this thesis, I presented my merits for wanting to work within the three fields of information architecture, persuasion and pervasiveness. I explained that the data I would collect, and the ideas that I would generate through the work with this thesis, would end up helping out a local company to communicate more efficiently with their customers.

The goal of the thesis was to present a set of theories from all three fields, analyse those theories in their own context as well as in the overall context of information architecture through the application of the hermeneutic circle thereby generating new knowledge from the overlap between the three fields, and then finally apply that new knowledge to an real-world scenario. I have certainly completed all the steps that I set out to, but what have I actually learned?

I posed a research question to validate the scientific basis for this thesis. That research question was:

How can a small company utilise the systems of pervasive and persuasive information architecture in communicative settings with their customers?

The reasoning behind the research question was that I wanted to use all the three different scientific fields to solve the underlying problem of getting users to use a given information system for its intended purposes. The research question itself was not bound by the casework with Ideaal, but answering it would certainly help solve the situation that they had found themselves in.

There is no straight answer to the research question. However, I do believe that I found several truths during my work on this thesis and through the casework with Ideaal that help to understand a solution to the question. First and foremost, I have determined that the overlap between all three fields is much bigger than I had anticipated. I spent a great deal of effort trying to find these overlapping parts, and I found them mostly in the end goals of the scientific fields. All three fields aim to improve the user experience through application of different tools, and most of these tools even seem to share several commonalities.

I found a link between persuasive technology and pervasiveness, in that both fields aimed to improve the information architecture of a given system in order to entice users to use that system. Persuasive technology mostly deals with the subject on the micro scale, whereas pervasiveness mostly deals with it on the macro scale (even traversing across different channels). It seemed to me that even though the two fields are not identical, it is possible to achieve one by employing the other.

I established that, in some sense, applying persuasive technology tools that were strong enough on the micro scale would allow the versatility of these tools to expand to the macro scale. Persuasive technology and pervasiveness turned into persuasive pervasive technology. Having recognised that link then allowed me to further work them into the third field of information architecture. This last part was almost easy, as both persuasive technology and pervasiveness deal with improving different systems in an information system, and information architecture then explains the terminology and framework for those different systems. Thus, turning persuasive pervasive technology into persuasive pervasive information architecture.

None of this really answers the research question though. In order to do that, we will instead have to look at where the three fields meet. Usability. All three fields attempt to improve usability, and it is in that term that we find the strongest tools to *utilise the systems of pervasive and persuasive information architecture*. I answered my research question by displaying a thought process and by example of a case. However, there is no *one* answer. There are hundreds of answers. Some of these answers lie in information architecture, some in persuasive technology and some in pervasiveness.

The answer to the research question is something that depends entirely on the context of a given information system. Some of the challenges of implementing an information system in a process can be answered by means of one of the three fields alone, but I have established a link between the three fields so strong that it would be far from optimal to not attempt to utilise all three at once.

In this process I also confirmed both my hypotheses. I confirmed that information systems must be pervasive in their application, and that it has to contain elements of persuasive technology to entice users to actually utilise the system. Therefore, the final answer to my research question is that a small company can utilise the systems of pervasive and persuasive information architecture in communicative settings with their customers by carefully selecting which elements of a system are relevant to those customers. When that is done, the information architecture of that system should be optimised to allow for persuasive technology tools on a micro scale, and these must be applied well enough that they can scale to the macro scale and become pervasive.

6.1 Final Thoughts

There has been a lot of different material to research and explain during the course of this thesis, and I have certainly learned a lot through this process personally. I would also hope that I am not alone in this. I hope that by showing the bonds between information architecture, persuasive technology and pervasiveness I have helped to achieve a new and broader understanding of how the three fields interoperate.

This has been a hermeneutic study of pre-existing theoretical data. As such, I cannot take credit for other people's work, and that is by no means what I am trying to do here. What I will say though, is that the bond between the three scientific fields is much stronger than I thought to begin with, and this thesis may have opened someone else's eyes too.

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