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COMMUNITY BASED DESIGN SUPPORT

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ABSTRACT

Different approaches of design methodology that have been developed throughout the history of the design methods movement have produced many insights into the structure of the design process (Alexander, 1964; Simon, 1969; Schön. 1983; Hubka and Eder, 1987; Pahl and Beitz. 1984; Roozenburg and Eekels, 1995). It seems however, that little of this accumulated knowledge is used in the daily practice of designing. The relation between design methodology and design practice is still weak (Cross, 1993; Achten et al. 2005). One reason might be that design methods are not addressing the designer's needs. And thus are not supporting the designer, with a specific task, to solve the problem at hand. (Badke-Schaub et al. 2005) The aim of this research project was to develop a solution for this problem: the concept of Community Based Design Support (CBDS). This concept, inspired by the online community platforms that are emerging on the internet, enables the integration of a personal, contextual, social and dynamic dimension in design methodology Based on the CBDS model a software platform was designed: Designflow. A prototype was built to test if the concept of CBDS can provide designers with efficient and effective design support.

KEYWORDS

Design methodology, online support, virtual communities, inducing cooperation, wisdom of crowds

1. INTRODUCTION

Designing is a complex activity that encompasses the development of products and services to fulfill the needs of people and society. In the process of design many kinds of information are integrated, for example social, economical, ecological, human, and political information. Designers need to cope with this complexity to be able to develop products that fit their future context. Design methodology aims to support designers in managing complexity by providing structure. A quote from Dorst (1997) describes what kind of questions methodology should be able to answer: "If I am a designer with the following capabilities and I am confronted with a design task with these characteristics, and I am working in this situation, and I have progressed to this particular point in the design process, then what should I do next?"

Throughout the history of design methodology, a number of issues have been subject of discussion, such as the structure of designing (Alexander, 1964), designing as a scientific activity (Gregory, 1966) developing a science of design (Simon 1969; Gasparski, 1990; Hubka and Eder, 1987), the nature of design activity (Schön, 1983; Lawson, 2001) and the role of the designer (Frankenberger et al., 1998). This has led to numerous important insights into design and valuable knowledge about designing and the designer. It seems however, that little of this knowledge is used in the practice of designing. The relation between design methodology and design practice is still weak (Cross, 1993; Achten et al. 2005). The most serious critics point to the fact that designers in practice do not use design methods on a large scale (Cross, 1993; Achten et al., 2005). One reason might be that design methods are not addressing the designer's needs in his design situation, with a specific task, providing support to solve the problem at hand. (Badke-Schaub et al. 2005) Designing is not only a complex activity that needs structure, it is also personal, contextual, social and dynamic activity. And thus, as Schön describes it

in a simple way: “the practitioner approaches each problem as a unique case. He does not act as though he had no relevant prior experiences; on the contrary. But he attends to the peculiarities of the situation at hand” (Schön, 1983, pp. 129).

In this research we propose that design methodology largely lacks these dimensions, and as a consequence does not address the designer’s needs. We propose that if design methodology does include them, it will be addressing the needs of designers much better, and thus will be more useful to designers. Online community platforms, like wikipedia.org, last.fm or amazon.com are personalised, interactive and social internet applications that address the needs of their users in an interactive way. By developing the concept of CBDS, a first attempt was made to overcome the gap between design methodology and design practise.

2. SURVEY

The research addresses both the subject of design methodology and online communities. Therefore a survey on design methodology and on online communities was done. In online communities, participation and contribution is crucial, and thus also the motivation of its members. Therefore literature on motivation in online communities was also surveyed.

2.1. Design methodology

Design methodology aims to describe the design process in its ideal form, and prescribe how it should happen in practice. It aims to help designers to transform ill-defined problems into coherent, integral solutions. This is done by “providing insights into the process, structure, rules and methods and by proposing general strategies of solving problems independent of a branch of industry” (Badke-Schaub, et al., 2005). Roozenburg and Eekels (1995) defined two central questions for design methodology:

- How does an effective design process look like?
- How should the design process be approached to let it be efficient and effective?

The methods trying to answer these questions provide knowledge designers can use to gain more insights into ways of designing that have proven to be successful. But if this is true why don’t all designers use these methods in practice. One reason might be that design methods are not addressing the designer’s needs in his design situation, with a specific task, providing support to solve the problem at hand (Badke-Schaub et al., 2005).

Design methodology has been predominantly occupied with the rational aspects of design thinking and design processes, and the generalization into models that have a universal character, or aim “to scientize design” (Cross, 2001, p.1). This has resulted in rigorous descriptions of design processes on an abstract level (Dorst, 1997). Because of this the methods and techniques that prescribe how to control design processes lack information that is important on a practical level.

2.2. Online Communities

An alternative approach to the current situation of disseminating design methodology is making use of the collective practical experience and knowledge of designers in an online community. This has the following benefits:

- It facilitates one-click uploading and distribution to thousands of consumers of designer generated content,
- The existing knowledge and experience is combined and any maintenance effort is distributed over the designers themselves.

This so-called ‘power of collective intelligence’ (Weiss, 2005) or ‘wisdom of crowds’ (Surowiecki, 2005) is used by many popular websites like Wikipedia.org or YouTube.com. Wikipedia is a web-based, free-content encyclopedia, written and moderated collaboratively and massively by volunteers. You Tube is a video sharing website. Users contribute not only by putting their personal videos on the website for others to see, but also by annotating and moderating them, thus enriching the content and making it better accessible for others. We assume that the use of an online community platform for designers would make design support more dynamic, more personal, more contextual, and more social.

Online communities depend on the availability of distributed knowledge and on the quality of the content. However, they can consist of very diverse users. It is found that for systems like Wikipedia only one percent of a community is responsible for almost all of the contributions. Approximately nine percent of the users contributes once in a while, and ninety percent only consumes (Adar and Huberman, 2000; De Valck, 2005). Most of them do not feel responsible to contribute to the community because

they usually remain anonymous. (Goren, Kurzban, and Rapoport, 2000; Harkins and Szymanski, 1989).

There is no central authority to enforce this cooperation. An alternative is inducing cooperation. People do help others without obvious enforcement by an authority, not only in real life, but examples of altruistic behavior in online communities abound (Fokker et al., 2007). The term altruism - also known as prosocial behavior in psychology - refers to all actions that provide benefit to others but that have no obvious benefits for the person who helps (Baron et al., 1998) nor prospects for future interactions (Henrich et al., 2003). So, what could possibly motivate designers to share their knowledge about and experiences with design methodology? The human motivations that could underlie the massive and voluntary cooperation in online communities are discussed in the next section.

2.3. Motivation in online communities

According to Kollock (1999) people can have four reasons for contributing valuable information to a community of people: (1) The expectation that one will subsequently receive useful help in return. Theories like reciprocal altruism (Trivers, 1971) and social exchange theory (Homans, 1958) explain that cooperation is conditional: Help will only be given when reciprocity is likely. (2) The increase of one's own reputation and status within the community. The theories of costly signaling theory (McAndrew, 2002) and competitive altruism (Hardy and Van Vugt, 2006) describe how publicly visible altruistic behavior increases the status within a group. (3) A sense of efficacy. Bandura (1995) has shown the importance of a sense of efficacy. By making regular and high-quality contribution to the community, a person can enforce his or her feeling he or she has an impact on the community and support the self image as an efficacious person (Constant, Kiesler, and Sproul, 1994). (4) The feeling of belonging. This is for instance supported by the social identity theory which explains that group membership contributes to the establishment of a positive self-concept (Tajfel and Turner, 1986) .

In line with these four motivations, Kwok and Goa (2004) discuss four practical applications into software features for online communities: (1) Contribution-reward mechanism: Positive contributions are rewarded with a higher status within the community. (2) Individual identity and profile generation: By enabling each member to create a personal, publicly visible profile, he or she will feel more commitment to and responsibility for the community. (3) Sub-community organization: The need to belong to a group of people can be catered to by enabling the creation of sub-community groups. These can be for example organized around a specific topic or project and will improve the feeling of responsibility and commitment. (4) Reviews and peer recommendation: Opinions and advice from other, trusted, members can have a positive effect on the value of the content for individual members, generating more interest for it and boosting commitment.

The motivational factors and related features are visualized in figure 1. For an elaborate overview of (social) psychological theories and possible applications to software features see Fokker et al. (2007).

3. PURPOSE

The purpose of the research was to embed design methodology in the context of design practice and investigate if this provides the designer with efficient and effective design support. The concept of online community platforms was used to facilitate the integration of personal, contextual and social dimensions into design methodology, and by thus

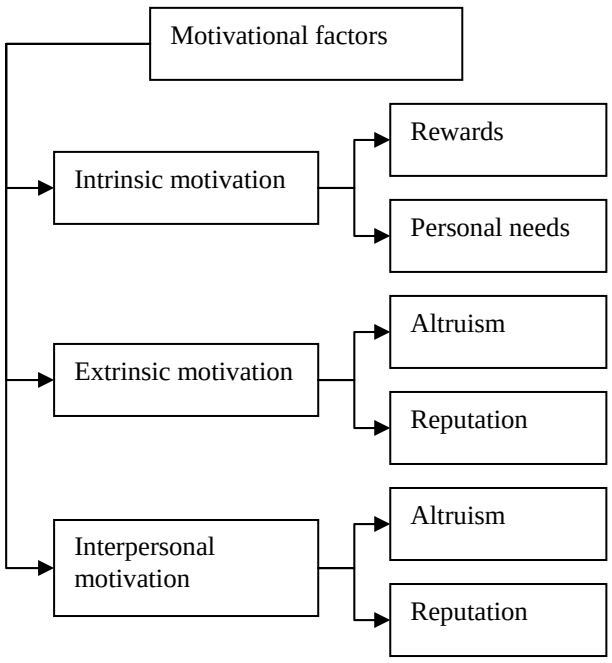

Figure 1 Overview of motivational factors in online communities and their relational factors

provide a way to address the needs of designers. The community approach created design methodology that can react to the needs of a designer. For example the collective experience of the community of designers can be used to determine relevance of methodology in specific situations, for specific designers and specific design tasks and provide this information instantly.

4. ASSUMPTIONS

Design methodology often does not fit the needs of designers. It does not relate to the characteristics of the situation at hand, or to the designer's characteristics. The central questions of this study were: Does the concept of online community platforms offer the designer efficient and effective design support? And "How can designers be stimulated to participate and contribute to an online community platform?"

5. METHODS

In this project the design inclusive research (Horváth, 2007) methodology was used which is depicted in figure 2. DIR "supports analytic disciplinary and constructive operative design research by the involvement of various manifestations of design in research processes as research means, integrates knowledge of multiple source domains and lends itself to multidisciplinary insights, explanations and predictions, but can also generate knowledge, know-how and tools for problem solving" (Horváth, 2007, pp.1). In this project, a software platform prototype served as a research means. This platform called Designflow, integrated knowledge from two source domains and was used to do gain insights in the concept of CBDS. Thus, based on the concept of CBDS, a software platform was designed, and this enables the evaluation of the concept of CBDS in the context of design practitioners.

In the exploration phase, ten designers from five different companies were interviewed. They were asked how they use information and methodology during their design process. The participants were asked to draw the information exchange that takes place with other parties during the design process. This phase gave insight into flow of information during the design process and the use of design methodology in practice.

The exploration led to the hypothesis that a solution for bridging the gap between theory and practice is an online community platform. A theoretical model

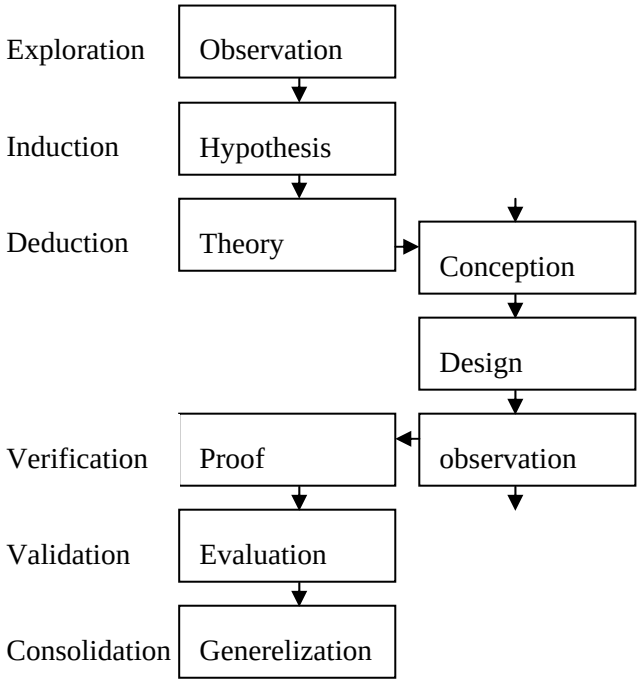

Figure 2 Mayor phases of the design inclusive research process. (Horváth, 2007)

of the mayor information flows within the design community and its context was created. The model was based on the different kinds of information flow form the exploration phase. Based on this model, the design phase consisted of the conception and design of Designflow, an online community platform that facilitates using, sharing, contributing and evaluating procedural information (including design methodology personal experiences). Then a prototype was built to verify if designers find the concept of CBDS effective and efficient. Nine designers within one company; evaluated a functional and a visual prototype. During the evaluation the participants were given a booklet in which responses were elicited about the different functions of the concept. After the test period of one week, all the participants were interviewed and asked to fill in a questionnaire. The data enabled to evaluate the functions of Designflow as well as the concept of CBDS as a whole.

6. RESEARCH

Ten designers from five different companies were asked to describe their way of working and the information (including methodology) they use and produce. The interviews were first analyzed on how much the designers used methodology during their design processes.

Table 1 Mentioned use of methodology in design processes by the participants compared to the total amount of activities in a typical project.

Methods / participant	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Brainstorming	X	X	-	-	-	-	X	-	-	-
De Bock & Dekker matrix	X	-	-	-	-	-	X	-	-	-
Mood board	X	-	-	-	-	-	X	-	-	-
Stakeholder analysis	-	-	X	-	-	X	-	-	-	-
Storytelling	-	-	-	X	-	-	-	-	-	-
Associative thinking	-	-	-	-	X	-	-	-	-	-
Vision in product design	-	-	-	-	-	X	-	-	-	-
User probes	-	-	-	-	-	-	X	-	-	-
Interviews	-	-	-	-	-	-	X	-	-	-
Program of demands	-	-	-	-	-	-	-	X	-	-
Life cycle analysis	-	-	-	-	-	-	-	X	-	-
Scenario writing	-	-	-	-	-	-	-	-	-	X
Flow diagram	-	-	-	-	-	-	-	-	-	X
Number of typical activities mentioned during the interview (total)	**36**	**19**	**30**	**27**	**33**	**35**	**43**	**36**	**29**	**18**

Table 1 shows the methodology that was mentioned by the participants as being part of their processes. Also, the total amount of typical activities that were mentioned during the interviews is shown. From table 1 we can see that the number of methods used by the participants compared to the total amount of typical design activities done during projects is relatively low. This confirms the previous claim that the relation between methodology and design practice is weak (Cross, 1993; Achten et al. 2005).

The ten interviews also showed ten different styles of working on a practical level, i.e. the level of subsequent activities. They showed that designers have unique approaches for each project they do influenced by their personal way of designing, the context of a project, the people that are involved and the dynamics of a project in time. Thus designing can be seen as a series of activities that are chosen in the midst of action. And designers adapt their approach for a design project to the situation they are in.

The second analysis of the interviews was focused on the information flows that were identified by the designers. All participants were asked to draw the kinds of information they used and produced during design projects. The typical kinds of information that were identified as part of their design projects in general are visualized in figure 3. The arrows in the model represent information that is typically shared in the design processes of the whole community. They can, but not neccesarely are always part of a single design process. Design methodology is seen as one kind of information that can be used during a project, depending on the characteristics of the design situation.

The model in figure 3 shows designers as part of a community at the core of the model. On the one hand, they provide input for design projects, by means of one or more designers from the community. On the other hand, the community is generates the collective experience, or meaning, The model also shows the design research community as part of the 'system'. They observe designers and produce, amongst other things, methodology, which can also be input for design projects Last, the model shows the context of the design community; technology , users and industry.

6.1. Pattern of the design community system

The relations between the elements of the model in figure 3 are information-based: each element needs

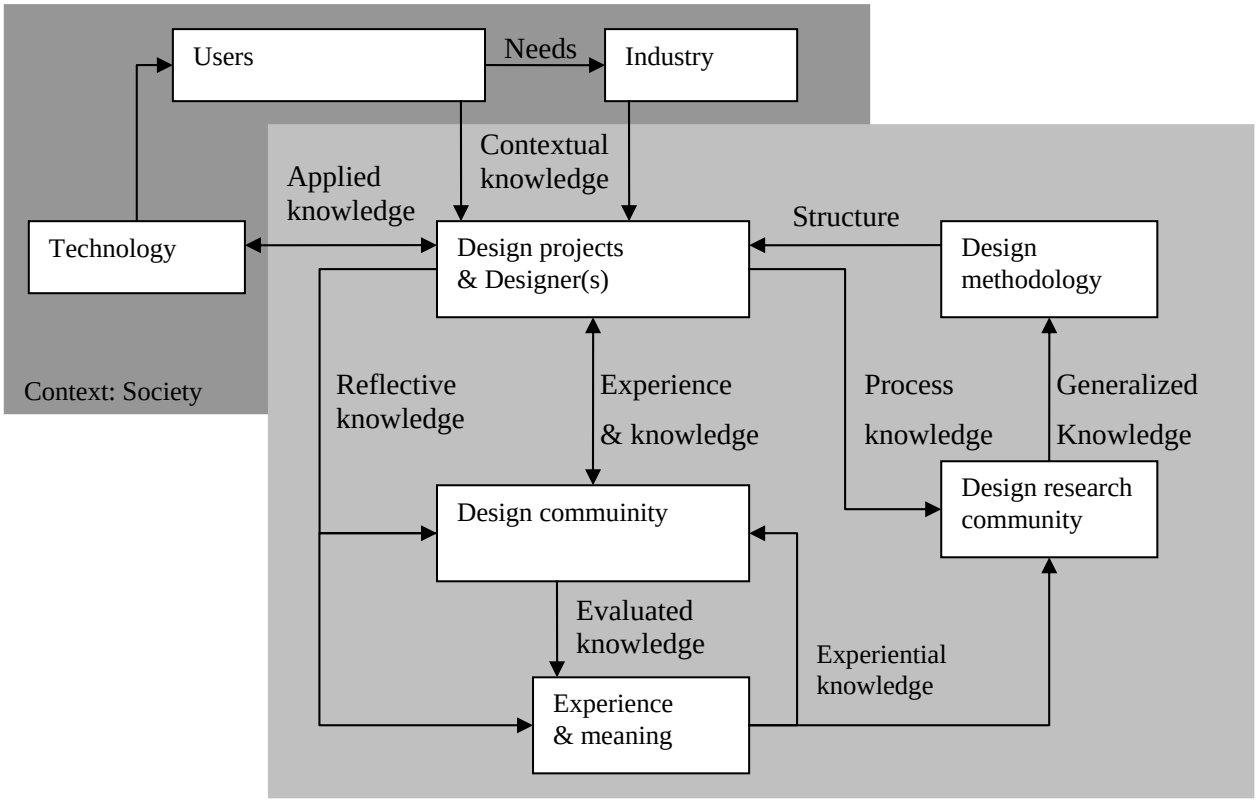

Figure 3 Conceptual model of the design community system and its context. Arrows represent the main information flows that are typical for design projects of the design community.

information input, and produces information output that again forms the input for other elements. Although on an abstract level the elements characterize the design community system best, on a more practical level, the level where designing takes place, it is the organizational pattern of relations between the elements that characterize the system better: the flows of information that keep the system 'alive' and enable the development of products. All elements that are part of this system are interrelated, and interdependent. We have seen however, that in practice some of the relationships are weak. For example a designers' experience with a specific approach is hardly shared with other designers, which results in re-inventing the wheel by thinking of suitable approaches to their projects again and again. These weak links makes the whole system rigid, inhibiting designers to learn from past experience and insight from design research to adapt to new design situations. From a systems' perspective, this results in sub-optimal performance of the whole design community.

When we look at the designers that do design projects, we can see that they relate to many different elements. They have to cope with input from different parties to be able to do successful design projects. And although design methodology aims to support designers to bring structure to their complex processes, it does not provide them with the adequate information about what methodology to use in which situation, at what time and in what way.

7. DEVELOPMENT

Community Based Design Support is a concept that is aimed at empowering a community of designers to collaboratively develop and share a body of design knowledge that is available to anyone at anytime for using, sharing, contributing and evaluating. Therefore, the CBDS model was translated into a concept for a software platform. The information flows that were identified in the CBDS model are supported by the software platform. The functions of the application are supporting all the flows of information of the CBDS model, and thus try support the design community system to function efficiently and effectively.

The key to this concept is the experience, meaning and information that is generated by the community of designers when using, sharing, contributing and evaluating the information content on an online platform. This allows users to find relevant methodology suited to their personal style and specific task, and receive recommendations for relevant and crucial process steps, methods or tools to use, etc. In other words: the experience of a community of designers is aggregated and accessible to the whole community. Methodology can be offered to designers based on their needs at a specific moment; on the characteristics of their way of working, their task, the circumstances, time pressure, etc.

8. APPLICATION

The application of the concept of Community Based Design Support is a software platform called 'Designflow'. Designflow has four basic functions:

- Personal profile,
- Advanced search functions (attached to a database of procedural design information),
- Workflow manager.
- Community access (see figure 4).

These functions of the application are based on the theoretical model of CBDS (figure 3). This means that the most important functions of the application are based on insights from the explorative phase and can be used to test the hypothesis.

8.1. Information sharing

Members of the community platform have a virtual profile which describes their characteristics (generated by the system and by the user) and their use and collection of information. This makes it possible for any user to navigate on the platform via the community of users in search for projects or people to learn from. Or to include methodology in their workflow that has been recommended by the system. Two kinds of information are needed to enable such information sharing: (1) procedural information (content); design processes, methodology, tools, activities and (2) meta-information; information about when, why, how and by whom specific processes were followed or methodology was used. Because the second type of information usually stays inside the head of a designer, some functions are integrated in the platform to induce designers to share their personal experience with processes and methodology. In this way the content becomes searchable and the system is able to learn from the community. In other words: design methodology is able to react to the needs of designers.

Folksonomy

A Folksonomy, a term coined by Tomas Vander Wal (2004), is a set of freely chosen, user generated keywords, or tags, related to objects in a virtual, social environment for one's own retrieval. The tags are usually open to all others in community. It is the opposite of a formal categorization of items; a taxonomy. A Folksonomy reflects the meaning the users of a set of content give to it, while taxonomy reflects the categorization an individual or a group of experts have given it. The value is derived from the people using their own vocabulary to add explicit meaning. On the CBDS platform the users can tag users, projects and design methodology while storing them in their collections. This helps the user to find content easier and also helps the community to search in the database easier.

User generated meaning

The relations between users, their projects and design methodology are aggregated to generate insight into their characteristics and use. These relationships can exist on three levels:

- A personal level: what kind of designer uses what kind of approach to design?
- A contextual level: in what kind of situation, and for what kind of design task what kind of approach is being used?
- A social level: how many designers use what kind of approach in what kind of situation?

8.2. User interaction

The CBDS application should support the day-to-day activities of designers, and improve the efficiency and effectiveness of their processes. In order to be accepted by the potential users however, the interaction with the system should be easy and should match with the normal activities of the designer. Three types of interaction of the user with the system are defined:

- Between users: social navigation
- Between a user and his project(s): workflow management
- Between user and content: social organization of information.

Social navigation

Usually designing is a collaborative effort, and social interaction between colleagues is a common and an effective way to access information that is needed. However, colleagues might be busy, or people with knowledge on a specific topic might not be available in the given situation. Designflow provides an online social network that includes the expertise and experience of its users. Also a natural way of social interaction is mimicked, while the network becomes much larger, and accessible on demand. Finished

projects are stored in relation to the creators, including the meaning they gave to it.

Workflow management

Design processes are dynamic and uncertain in nature, since design problems are ill-defined problems (Simon, 1969). Thus, the management of design processes is also dynamic. Designflow provides a platform that supports the dynamic management of design projects and gives designers the opportunity to search for suitable methodology and external advice at any moment in time.

Social organization of information

In a design company, projects and information is stored i.e. for the use in future projects. This documentation is often realized in pre-categorized or chronologically ordered databases, which results is poor retrieval rates of information. Designflow supports a social way of organizing information; by organizing any data around the user profiles of designers, including the rich meaning they gave it, the chance of finding it back becomes much larger. Furthermore, the meaning that is attached to any piece of information enables the system to help the users by recommending content, based on user or project characteristics.

8.3. Designflow

Designflow is (the design for) a software solution that supports the design community to share design information in an integrated way. The design also proposes to integrate personal, contextual and social information to the design methodology. It is both, a translation of the conceptual model of CBDS and a community 'tool' for designers in practice. This means that it is a platform to support information sharing which is based on a specific idea of how the design community handles information, and a specific idea about how it should be supported. The basic functions as they appeared in the Designflow concept are visualized in figure 4 to 6. The personal status page in figure 4 shows the contributions the user has made to the community. It also shows overall user activity, called the design style, which gives insight into the expertise of the user .The design style is frequency graph of typical activities of the user, including the methodology that was used. Based on this information the system can recommend specific methodology. Other users can also see the user's design style and decide if they can learn something from the user. Users can create a

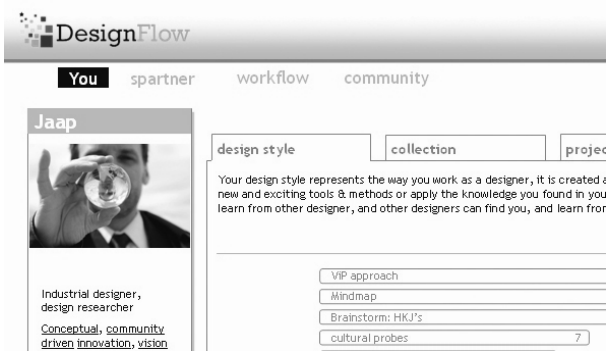

Figure 4 Screenshot of the opening page on Designflow. The four basic functions are beneath the Designflow logo

Figure 5 Screenshot of the personal profile page. Designflow keeps track of the personal way of working and their status within the community.

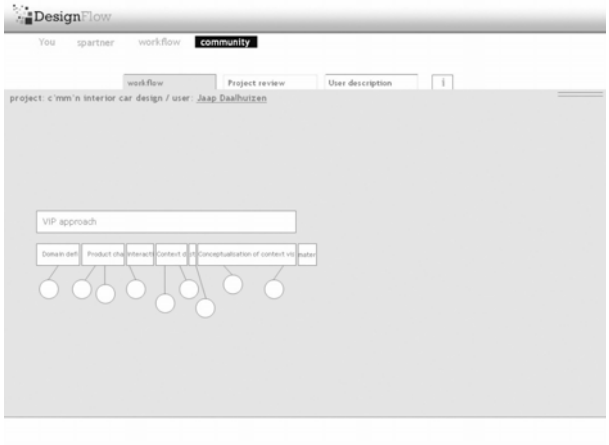

Figure 6 Screenshot of the workflow support page. Designflow enables designers to plan their processes quickly and to add methodology.

collection of methodology that they find interesting, for example for use in a later project. The platform can be searched for projects (including typical activities) design methodology and users. The search results for design methodology can be filtered for a user's or project's characteristics. The content of the database is open source, is editable and can be reviewed. Users can save and review design methodology for later use. By giving personal keywords to the articles they are easier to find later on. It also becomes easier for other users to find articles since they can also search based on user generated keywords (see also folksonomy in section 8.1). Projects can be managed in the workflow manager. The phases and activities within a project can be planned and altered, design methodology can be added and all content can be tagged and reviewed.

Users can create a social network, through which information can be accessed in a natural (social) way via peers. There are three kinds of possible contacts implemented in Designflow:

- Friends: users can gather other users to join their social network based on mutual agreement.
- Neighbors: the system can recommend other users with a similar design style (or if preferred with a complementary design style).
- Groups: users can create groups organized around specific topics to collaborate, for example a project, or a specific design method.

9. RESULTS

For the evaluation of Designflow, nine designers were interviewed. They also evaluated the concept of Designflow with a questionnaire, of which the results can be seen in figures 7 to 11. The figures show the average scores that were given to the questions and are divided into five topics: online design methodology, social navigation, integrated project management support, and personal design style.

9.1. Evaluation of Designflow

Designflow is (the design for) a software solution that supports the design community to share design information in an integrated way. The design also proposes to integrate personal, contextual and social information. It is both, a translation of the conceptual model of CBDS and a community 'tool' for designers in practice. It is a platform to support information sharing which is based on a specific idea of how the design community handles information, and a specific idea about how it should be supported.

First of all, the conclusion from the open interviews was that the concept of Designflow is very good and promising. It addresses needs that are very relevant to design practice, and are not addressed right now. The different topics that the concept of Designflow addresses are discussed below.

Online design methodology

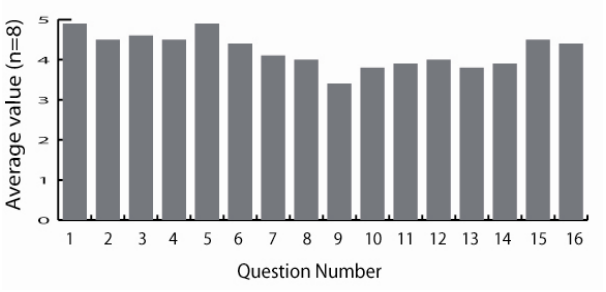

Figure 7 Average scores given to questions about functions related to the concept of online information sharing. Scores ran from a negative response (0) to a positive response (5).

Designflow supports online access to procedural information and specifically to design methodology. The participants were very positive about the possibility to search for a variety of methods and tools that could be used in different situations in their projects. Also the possibility to access experiences of previous users, application in previous projects and examples of implementation was seen as a big advantage. Figure 7 shows the feedback in the general concept of online information sharing within the design community. Figure 8 depicts the average scores that were given by the participants for the different functions related to online design methodology.

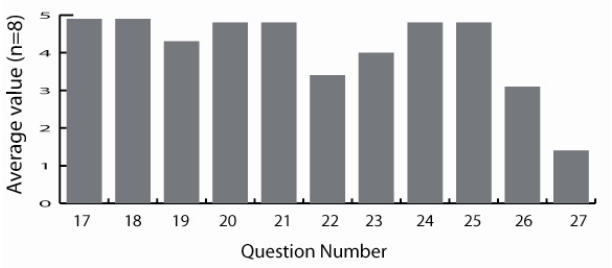

Figure 8 Average scores given to questions about functions related to online design methodology Question 27 addressed the expected frequency of use with a scale running from very frequent (1) to almost never (5)

Social navigation

Designflow supports a virtual, social network of designers. Users can search for other designers to access for example methodology, expertise, reviews, etc. The participants evaluated this feature as positive. By supporting the natural way of information sharing between designers, via the social network, on a virtual platform the participants thought that this can become much more efficient than the current way they share information.

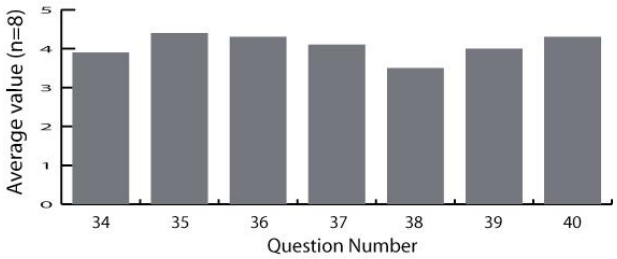

Figure 9 Average scores given to questions about functions related to social networking within an online design community.

Integrated project management support

Designflow support project management by means of a workflow planner. The possibility to do project management within Designflow was evaluated both, project planning quickly and add positive and negative. The possibility to create a methodology to the project was seen as valuable. However the option that such a project management tool would be usable for all aspects of a project was seen as too complicated.

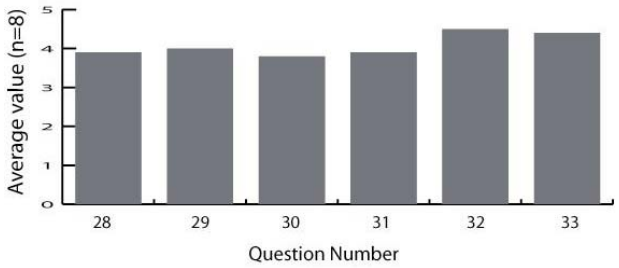

Figure 11 Average scores given to questions about functions related to integrated workflow management.

Personal design style

Designflow allows designers to create an online identity that keeps track of their activities and projects on the platform. The participants were also positive about the possibility to receive recommendations for methodology from the system based on their way of working (design style). The possibility to search for other designers with a specific expertise was seen as valuable. For example it would make it easier to search for people with a specific expertise.

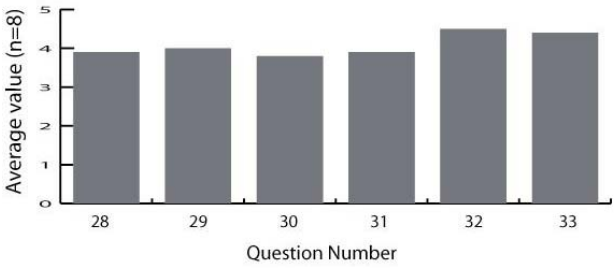

Figure 10 Average scores given to questions about functions related to a virtual personal profile and design style.

10. DISCUSSION

Design methodology, at this moment, aims to provide structure to the design process. It usually does this by providing a description of a generalized design process, on an abstract level. We propose that due to this abstract and generalized nature of design methodology, is has largely distanced itself from the needs of the designer in practice. With the concept of CMBS we have developed a way to include those dimensions into design methodology that are valuable for designers on a practical level. CBDS is

therefore not a kind of knowledge management system, but rather a broadening of the scope of design methodology. This research was a first step towards understanding why designers do not use design methodology and towards developing a better way to support them. With further development and research we can create a better understanding, and develop (community based) design methodology that fits the needs of designers.

10.1. Community Based Design support

The conceptual model of CBDS is the representation of the elements and information flows that are characteristic for the design community as a whole, including the design research community. It has the purpose to bridge the gap between design theory and design practice by including them both in the solution that was developed.

Structure and organization

The conceptual model is the representation of the organizational pattern of the system and describes different information flows of the design community and the elements of that system. The elements are the *design community*, their *design projects*, the *collective experience and meaning*, the collection of *design methodology* and the *design research community*. The properties of the elements and the way they relate at a specific moment in time form the structure of the system at that moment. This structure can change, because the elements can change: designers can evolve and develop different ways of working. For example because they adapt to changes in society, the nature of their projects can change from a focus on engineering to a focus on conceptualization, the design research community can change their focus of research, etc. Despite these changes however, the organization of the elements will stay the same. Design researchers will keep investigating designers, and trying to support them with design methodology. Designers will keep designing products for clients and use methodology to structure their processes.

As it is clear from the description above, the organizational pattern, i.e. the pattern of information flows, is not as dynamic as the elements. The properties of the information flows do not change easy, e.g. if designers would not produce products (applied knowledge) they would not be designers anymore. If design researchers would not study designers, their processes or their products, they would not be design researchers anymore. Thus, the information flows are inherent to the design community system as a whole. We suggest that the effectiveness and efficiency of the way design methodology is shared within the design community determines the 'health' of the system. We also suggest that at this time some of the information flows are not shared properly. And that this can be supported and improved by the CBDS platform

We can state that the gap between design research and design practice exists because some of these information flows do not always reach their intended users, or at least do not reach them in an appropriate way. This also became clear from the evaluation of the interviews:

"I think that within a design office there is a need for such a tool, (...). It is something new, it does not exist".

"I think there is an enormous opportunity (...) I think there is a niche that is not touched, and is new. This (Designflow) can be a contribution, not only for research but also for practice"

10.2. Comprehensiveness and confidentiality

On a community platform that is open and accessible via the internet, design information (e.g. methodology and information about the context) can be shared between members of the community. This has the advantage that for example methodology can be used, shared, contributed and evaluated in a networked way. However, when design information is shared within an online community privacy issues arise. The risk of having a competitor seeing your design process for a particular product does not seem attractive to many design companies.

It is however quite possible with modern information technology to built in security functions that can be used to protect sensitive information. Moreover, CBDS does not need members to contribute information about complete processes to the platform. It can learn from single choices within a process to add to the collective intelligence of the community platform. For example: the choice of a specific kind of designer to use a specific method in a specific moment in his or her process is very valuable knowledge when this kind of information is aggregated from hundreds of users.

The main advantage of CBDS, as opposed to knowledge management systems, is that it supports all the different information flows of figure 3 in an

integrated way. It also aggregates the meta-information that users of the platform attach to procedural information. It can therefore 'learn' from the community as a whole, and include all the dimensions that are relevant in a design process. It can learn from all the designers that use the system, and feed this collective experience back into the community.

11. CONCLUSIONS

The research started with an exploration of what kinds of information designers use, and what role design methodology plays in this. We concluded that methodology is only sparsely used. One reason for this may be that methodology does not fit the needs of designers. Based on these insights, we defined research questions with which we hypothesized that to overcome the gap between research and practice an online community approach is a solution.

In more specific words; we concluded that every design project is approached in a unique way on an activity level; the level of subsequent activities. And design methodology, having the goal of supporting designers with structure for their processes, lacks the proper dimensions for it to fit these needs. We proposed that by including the personal, contextual, social and dynamic dimensions to design methodology this gap between the needs of the designer on a practical level and the generalized, abstract structure that design methodology offers can be bridged. The development and testing of a first prototype showed us that CBDS is able to bridge this gap. The community approach enables us to take a broader approach to design methodology and create a better fit.

One of the kinds of information that deserves special attention is the experience and meaning that is created collectively by designers during their projects. It is needed to be able to learn from the past. To apply information that was created somewhere in the community in a new situation, by a different designer for a different task, this meaning gives important insights. Yet, currently it does not reach its potential users. However, design methodology would become much more valuable if these information flows would be integrated. "When you have a system with which you can share information very easily, with which you can built a virtual memory. A collective memory of experiences that you have (...) this is very valuable for people who work in innovation".

CBDS can be a powerful tool in doing research on how designers work, how their processes are created. And more important what their needs for methodological support are. This would be very valuable input for the researchers to create more efficient, but most important more effective methodology that can be used effortlessly by practitioners as well as students.

12. REFERENCES

Achten, H.H., Dorst, K., Stappers, P.J. and de Vries, B. (2005). A decade of design research in the Netherlands. In Achten, H.H., Dorst, K., Stappers, P.J. and de Vries, B. (eds.): Design research in the Netherlands 2005: Proceedings of the symposium held on May 19, 2005. Eindhoven: University of Technology, i-vii.

Adar, E. and B. A. Huberman (2000). "Free riding on Gnutella." First Monday.

Alavi, M. and Leidner, D.E. (2001). Review: knowledge management and knowledge management systems: conceptual foundations and research issues. MIS quarterly. 25(1), 107-136.

Alexander, C. (1964). Notes on the synthesis of form. Harvard University Press.

Badke-Schaub, P., Lloyd, P., van der Lugt, R. and Roozenburg, N. (2005). Human-centered design methodology. Proceedings of the design research in the Netherlands symposium.

Bandura, A., ed. (1995). Self-Efficacy in Changing Societies. Cambridge: Cambridge University Press

Baron, R. A., D. Byrne and B. T. Johnson (1998). Exploring Social Psychology. Needham Heights, MA, Allyn and Bacon.

Constant, D., Kiesler, S. and Sproull, L. (1994). "What's Mine Is Ours, or Is It? A Study of Attitudes about Information Sharing." Information Systems Research 5(4):400-421.

Cross, N. (1993). Science and design methodology: a review. Research in engineering design, 5, 6-69. London: Springer Verlag.

Cross, N. (2001). Designerly ways of knowing: design discipline versus design science. Design issues, 17(3). Cambridge MA: MIT Press.

De Valck, K. (2005). Virtual Communities of Consumption: Networks of Consumer Knowledge and Companionship. Rotterdam, Erasmus University Rotterdam. PhD.

Dorst, K. (1997). Describing design - comparison of paradigms. Thesis Delft University of Technology, Delft.

Fahey, L. and Prusak, L. (1998). The eleven diedliest sins of knowledge management. California management review. 40(3), 265-276.

Fokker, J., H. De Ridder, P. Westendorp and J. Pouwelse (2007). Inducing Cooperation in Peer-to-Peer Television Systems. EuroITV'07. A. Lugmayr, Golebiowski, P. Amsterdam, The Netherlands, TICSP, Tampere: 314-318.

Fokker, J., H. De Ridder, P. Westendorp and J. Pouwelse (2007). Psychological backgrounds for inducing Cooperation in peer-to-peer television. EuroITV'07. Amsterdam, The Netherlands.

Frankenberger, E., Badke-Schaub, P. and Birkhofer, H. (eds.) Designers - The key to successful product development. (1998). London: Springer.

Gasparski, W. (1990) Editorial: Contributions to Design Science. Design Methods and Theories 24(2): 1186–1194

Goren, H., Kurzban, R. and Rapoport, A. (2003). social loafing versus social enhancement: public goods provisioning in real-time with irrevocable commitments. Organizational behavior and human decision processes, 90, 277-290.

Grover, V. and Davenport, T.H. (2001). general perspectives on knowledge management.: fostering a research agenda. Journal of management information systems. 18(1), 5-21.

Hardy, C. L. and M. Van Vugt (2006). "Nice guys finish first: The competitive altruism hypothesis." Personality and Social Psychology Bulletin 32(10): 1402-1413.

Harkins, S. and Szymanski, K. (1989). social loafing and group evaluation. Journal of personality and social psychology, 56, 934-941.

Henrich, J., P. Young, E. Smith, S. Bowles, P. Richerson, A. Hopfensitz, K. Sigmund and F. Weissing (2003). The cultural and genetic evolution of human cooperation. Genetic and cultural evolution of cooperation. P. Hammerstein, MIT Press: 445-468.

Homans, G. C. (1958). "Social Behavior as Exchange." American Journal of Sociology 63(6): 597-606.

Hubka, V. and Eder, W.E. (1987). A scientific approach to engineering design. Design studies, 8(), pp. 1- 17.

horváth, I. (2007). comparison of three methodological approaches of design research. Proceedings of the international conference on engineering design 2007.

Kollock, P. (1999). the economies of online cooperation: gifts and public goods in cyberspace. Communities in cyberspace. London: Routledge.

Kwok, J.S.H. and Gao, S. (2004). knowledge sharing community in P2P network: a study of motivational perspective. Journal of knowledge management, 8(1), 94-102.

Lawson, B.R. (2001). The context of mind. In: Lloyd, P. and Christiaans, H. (2001). Designing in context. Delft: DUP science, 133-148.

Markus, M.L. (2001). Towards a theory of knowledge reuse: types of knowledge reuse situations and factors in reuse success. Journal of management information systems. 18(1), 57-93.

McAndrew, F. T. (2002). "New Evolutionary Perspectives on Altruism: Multilevel-Selection and Costly-Signaling Theories." Current Directions in Psychological Science 11(2): 79-82.

Pahl, G. and Beitz, W. (1984). Engineering design. London: the design council.

Roozenburg, N.F.M. and Eekels, E.J. (1995). Product design: fundamentals and methods. Whiley, Chicester, UK.

Schön, D.A. (1983) The reflective practitioner: how professionals think in action. New York. Basic Books.

Simon, H.A. (1969). The sciences of the artificial. Cambridge Mass. MIT Press.

Surowiecki, J. (2005). The wisdom of crowds: Why the many are smarter than the few and how collective wisdom shapes business, economies, societies, and nations. New York, Anchor Books.

Tajfel, H. and J. C. Turner (1986). The social identity theory of intergroup behavior. Psychology of Intergroup Relations. S. Worchel and W. Austin. Chicago, Nelson Hall: 7-24.

Trivers, R. (1971). "The Evolution of Reciprocal Altruism." Quarterly Review of Biology 46: 35-57.

Wal, vander, T. (2004). Folksonomy coinage and definition. Personal weblog of Tomas vander Wal. retrieved from http://vanderwal.net/folksonomy.html on July 19th 2007.

Weiss, A. (2005). "The Power of Collective Intelligence." netWorker 9(3): 16-23.

wood, J. (2000). the culture of academic rigor: does design research really need it? The design journal, 3(1), p. 44-49.