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DISCOVERY AND EVALUATION OF DESIGN METHODS IN PRACTICE: AN EMPIRICAL STUDY

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ABSTRACT

Web platforms and literature on design methods allow users to search for existing methods based on the method's name and stage of use. Little support is provided to assess whether a method is appropriate for the task at hand and the context where the method will be applied.

In this explorative study, patterns in searching, selecting, assessing and exchanging experiences with peers in professional practice were analyzed across a range of disciplines. This work reports on our findings from interviews conducted with practicing engineers and designers.

Several similarities in the way practitioners find, select and assess new methods were found and interesting differences were identified for the practices in exchanging experiences with peers.

In this work, we present the findings of our interview study along with directions for future work to better understand design processes in professional practice.

1 INTRODUCTION

The integrated use of tools, techniques, and methods, which are intended to support designers in their work, is a subject of design methodology. A design methodology is "a concrete plan of action for the design of technical systems (…). It includes plans of action that link working steps and design phases according to content and organisation." [1] Examples of design methodologies for mechanical engineering are [1–9].

Design methodologies aim to structure the design process, to support planning of product development projects, and to provide support for related design activities, thereby to avoid failures. The use of a design methodology as a way of thinking is said to enhance the probability of a successful product development project [10]. *"[…] even though it has seldom been established 'scientifically' that design methods work, it is certainly sensible to use these tools sensibly, especially in situations in which the firm's own experience falls short, and the design process threatens to come to a standstill."* [11]

The process models proposed in the different design methodologies draw on various design methods. Roozenburg and Eekels [11] (p.38 according to [12]) describe a method using the following criteria:

- A method is a specific way to proceed
- A method is a rationale procedure; following the prescribed procedure increases the chance of solving the problem
- A method is general – applicable to more than one problem.
- The use of a method is observable

Pahl et al. [13] (german version p. 750) define a method as a "systematic procedure with the intention to reach a specific goal" (in german "planmäßiges Vorgehen zum Erreichen eines bestimmten Ziels").

1.1 Methods and methodologies in practice

A major critique concerning design methodology is its sparse application in practice [14–18]. Design methodologies are mainly used for teaching, at least in the US and Central Europe, but industry adoption of methodologies has been limited and companies remain unaware of many methodologies. Reporting on a survey of UK industry, Araujo et al [18] state: "In most cases, the company was not aware of

the methods that are available. In these companies, concepts tended to be developed in parallel with the market research phase, and detail design commenced as soon as a feasibility study had been completed." [14]

Wallace [19] states that much of the support that has been developed by design researchers over the past 40 years has not been transferred into practice. However, some of the underlying concepts of the developed methods did find their way into practice and had a great impact on design processes in industry [20].

Araujo et al. [14] report that the participants of their study tended to assess the contribution of methods to product quality improvements as higher if the methods are implemented as software tools rather than as purely paper based tools.

Wallace [19] summarizes reasons identified by the academic community for the slow or absent transfer of knowledge from academia (developing new methods) to design practice (applying methods). These reasons include: methods tend to be too complex, abstract and theoretical; they require too much effort to implement; and the immediate benefit of applying them is not apparent. Wallace then argues that many of the methods – irrespective of their efficacy and efficiency - are not applied in practice because no one is responsible for their transfer into practice, thus a real evaluation of their efficacy and efficiency never happens. Wallace refers to this as the missing link between academia and design practice (see Figure 1). Andreasen [21] supports this argument, stating that "typical toolmakers have neglected the tools' proper domestication".

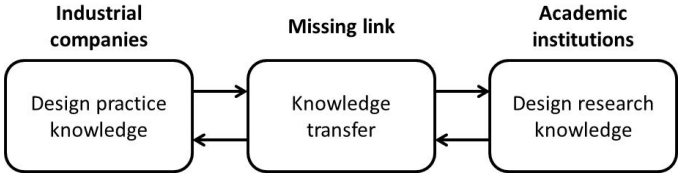

Figure 1: Transfer of knowledge between academia and industry [19]

1.2 Having the right mindset

Andreasen [21] states that a difference exists between the formal description of a method and the "necessary understanding for proper execution in a treatment". He refers to this proper treatment as a mindset, which incorporates the insight into the "theory behind the method's fundamental mechanism" and "an understanding of its proper application" [21].

Mindsets [22,23] represent mental states of a person, leading to a preference of specific sets of mental processes depending on the particular mode of action "that produce a disposition or readiness to respond in a particular manner …" [24]

"A mindset is the proper understanding of a method's use in accordance with the designer's reality: interpretation of task, situation, execution, validation etc. and in accordance with the method's background and proper use." [Andreasen M.M., personal communication, 2013]. Andreasen further postulates the following to articulate the socio-technical interrelations of methods:

- "A method is a prescription or instruction of, how an actual task shall be done.
- Methods belong to a context which makes the actual application meaningful.
- Methods' execution builds upon an interpretation of the reality and the practice they shall operate into.
- Applying a method happens in a social system, a community of practice and is the result of negotiations, interpretations (especially of data) and evaluations." [21]

2 APPROACHES TO THE TRANSFER OF DESIGN METHODS AND DESIGN METHODOLOGIES

2.1 Textbooks and web-repositories

Design methods and design methodologies are largely transferred via textbooks and it seems that for many designers their academic training is the main source for knowledge about design methodology and design methods. There are some past and present attempts to transfer textbook-based design methodologies into web-based method databases. Examples are [25–30]. Some of these databases provide interesting additional features, which are not provided by textbooks:

- Visual overview of entire methodologies
- Searchability
- Linking of methods to highlight similar or subsequent methods
- Templates for the execution of methods
- Presentations for training purposes
- Initial guidance for selection of methods

Despite the large efforts taken, each database has some or all of the following major limitations/areas of improvement:

- Limited input from design practice: the database is created primarily by academics
- Limited resources: the content is provided by a (small) team, which limits the coverage and depth of the provided support
- Static: many databases are not maintained after the original team leaves the project; new methods and tools and user feedback are not considered or incorporated
- Pure repository: methods are not linked to a methodology
- Generic: the database does not support the application of methods in specific contexts

2.2 Community based web platforms

Motivated by the lack of information in standard literature about context-specific adaptations, which are critical for the practical application of methods, Daalhuizen et al. [31] propose the concept of community-based design support (CBDS). CBDS aims to use the "power of collective intelligence" in order to collect knowledge of designers about method application. CBDS was prototypically implemented as a web-based tool to serve as a platform for designers for exchanging descriptions of design methods and exchanging knowledge and experiences about design method application. Unfortunately, the development of the CBDS-based platform that was called DesignFlow was not continued.

A central challenge to community-based platforms is the availability and quality of knowledge and the willingness of practitioners to share it with others. Daalhuizen et al. [31] noted (referring to [32,33]) that on platforms like Wikipedia, only one percent of users is responsible for the majority of all contributions. The other 99% of users contribute seldom or not at all. However, within a focused community of practice, knowledge sharing may be enhanced.

A community of practice is a group of people engaged in collective learning for a shared interest or domain [34]. A community of practice is defined by three crucial characteristics:

- Domain: the shared interest area of group members
- Community: the activities and discussions that allow for relationships and collaborative learning
- Practice: the shared resources developed by the community to address domain-related problems

Gathered around a shared area of interest, group members often learn from each other, as communities of practice are generally made up of practitioners at all levels. Hew and Hara [35] found that sharing in an online community of practice was motivated by five factors: (a) voluntary joining of the community; (b) a desire to improve the profession; (c) obligation to share after benefiting from previous knowledge sharing; (d) a non-competitive environment within the community; and (e) polite and subject-appropriate exchanges. To help cultivate an online community of practice, Cambridge, Kaplan, and Suter recommend a combination of *face-to-face meetings, online events,* and collaboration over time within a *persistent web environment* [36].

TheDesignExchange [37] was developed to serve as the persistent web environment for the emerging human-centered design community of practice. In addition to an extensive repository of design methods and design case studies, theDesignExchange seeks to be a collaborative space for design and design research practitioners to discuss and share practice. This is another example of an effort toward a CBDS platform, and is available at thedesignexchange.org.

3 STUDY DESIGN

The purpose of the presented explorative study was to learn how design methods are discovered and evaluated, i.e. found, selected, applied, and assessed, in the product development process in professional practice.

3.1 Research questions

In order to raise awareness that an appropriate mindset is needed to apply a specific design method or design methodology, more is required than just telling practitioners that a design method is not a straightforward recipe for success that can be applied without any creative or critical thinking. Formal method descriptions often lack any guidance on adapting to particular circumstances or limitations, and may leave out key steps or approaches that seem apparent to the author. A challenge for the development of design methods and design methodologies is understanding what enables the successful application of a method in a specific context. This understanding is necessary to improve the training and adoption of design methods and methodologies in practice, as well as their adaptation to a particular context. It may also facilitate the development of a system that can make recommendations of suitable methods and methodologies given a particular context. For such a recommendation system, we need a better understanding of what constitutes the (relevant) context of product development [38], and how practitioners discover and evaluate design methods and methodologies, i.e. assess the fit of a method to a certain context prior to and after its application. The study presented in this paper is focused on this discovery and evaluation and is guided by the following research questions:

- How do practitioners search for and find new design methods and methodologies supporting their design activities?
- How do practitioners select and adapt a particular design method?
- Are practitioners willing to share their knowledge?

3.2 Methodology

The data was collected through 11 semi-structured interviews with industrial professionals, carried out over a period of five months. A pilot interview was used to verify that questions were easily understood and to adapt the interview guidelines when necessary.

The interviews were carried out in person, and via telephone with participants in Central Europe. The interviews lasted between 90 minutes and 180 minutes, and were conducted in German.

Participants were recruited via e-mail contact. Possible contacts for this explorative study were known before from previous contacts with companies in which the participants work. Whenever possible, audio recordings were made in parallel to written notes in order to allow verification of the written notes. No personal identifiers were noted to ensure anonymity of the participating designers.

The interview questions covered the following four sections:

- The company and nature of business
  (e.g. number of employees and designers, annual turnover, main products, type of business)
- Personal details
  (e.g. training, years of professional experience, job responsibilities)
- A typical design project executed in the company
  (e.g. deliverable, intended market area, duration, budget, number of people involved, design approach and core design activities, project success)
- Design methods
  (e.g. used methods, approach to find and select methods, sources, adaptation, assessment of methods, sharing of experiences)

3.3 Sample profile and context

Represented companies

The 11 participants belong to companies that can be categorized as small, medium or large sized enterprises. Two distinct groups can be discerned: Engineering companies (all sizes) and highly specialized design studios and design consultancies (number of employees typically below 50).

The products developed by the studied companies are intended for the following industries: automotive and aerospace, home appliances, plant engineering and construction, furniture, software and services.

Every company that was represented by an interviewee has core competencies in product development and design. Only the medium and large sized companies have their own competencies and facilities for manufacturing.

A short overview of company details is provided in Table 1.

Table 1: Company details

Number of employees	Small (<30)	Medium (50 – 500)	Large (>500)
	4	3	4
Number of designers	<10	10-50	>50
	3	5	3
Type of business	B2B	B2C	B2G
	7	2	2

Interviewees

The interviewees have an average of 8.2 years professional experience with a minimum of 2 years and a maximum of 20 years. Nine interviewees hold a Masters of Science or Diploma degree (equivalent to a Master of Science) in an engineering related discipline; four hold a PhD in engineering. Two interviewees have a degree in industrial design.

The interviewees are all involved in the design activities of their companies. The interviewees belonging to medium and large sized companies have roles as team leader or project leader. One interviewee is head of the development department. Four interviewees working in small design studios or design consultancies are managing partner or owner of the company.

4. FINDINGS

4.1 Reported product development projects

The interviewees were asked to describe a recent design project in their company, therefore providing a better understanding of the typical activities and challenges of their working practice. Using a reference project throughout the interview helped in understanding the context of responses and allowed answers to build on each other.

Overview

The duration of the product development projects discussed ranged from 3 months to 3 years. The budgets varied between 30 thousand Euros for a small consulting project up to 250 million Euros for a large engineering project. The number of designers involved in the projects varied from solo designers (in the small design studios) up to 50 designers working in a team. Usually, the number of designers involved varied over the project with a peak in the second half of the project. In most of the projects external companies and experts were engaged to provide expertise on special topics (e.g. manufacturing, service design, industrial design, simulation and engineering optimization). The largest portion and most important elements of the design were always developed in-house with the exception of projects conducted by the design consultancies, which often closely collaborated with clients (sometimes taking the role of facilitator, sometimes of designer).

Project success

The interviewees were asked to assess the success of the projects. The assessment was done in two steps.

First, the interviewees were asked to provide their personal assessment, which was not guided by any specific criteria. Seven out of the eleven assessed their projects as successful. Three projects were assessed as less successful than expected and one was assessed as not successful.

Second, specific dimensions of project success [39] (reaching the overall project objective, stakeholder satisfaction, consumer satisfaction, business benefits, fulfillment of requirements, compliance with proposed project plan, i.e. budget, schedule and process) were analyzed. The analysis of the assessment of the specific criteria revealed that compliance with the project plan was less important to project success than consumer and stakeholder satisfaction and business objectives were. Many projects that were not completed within budget and time were assessed as successful, while all successful projects were seen as satisfying consumer and stakeholder requirements.

The interviewees were carefully reflecting about the projects and provided detailed explanations for their ratings. Those projects that were assessed as not or less successful had failed to create the expected return for the business or were characterized by major design iterations. Even though the interviewees did assess these projects as not or less successful than expected, they valued the experience they gained during these projects. The interviewees in these cases reported that mistakes that caused a major iteration led to changes in their design process and to the inclusion of new design activities and methods. One interviewee explained that because of these mistakes, the design team learned a lot and the company is now able to develop better products than before. The perception of a positive effect of new a design method on the product quality is important to demonstrate that resources for training and for additional activities are well invested.

4.2 Design methods

Typical methods used in the projects

While the interviewees easily reported the details of their projects and the products they developed, the conversation about the methods they apply was much more challenging. Many of the experienced interviewees did not know the names of the methods they use, as the names are not important for them, even though they are using many common methods. Some interviewees were not aware that they are using methods they learned (formally or informally) and did not reflect that their activities usually follow structured procedures. This required a reformulation of questions during the interviews, including a clarification of what a method is and pointing to some examples in order to avoid misunderstandings. To identify the methods they use, they then explained the activities and inputs and outputs of the activities they engage in, rather than using standard method names.

Table 2: Examples of used methods and groups of methods

Design studios and design consultancies	Personas, User interviews, Storyboarding, Lego serious play, Videos, Diaries, Affinity maps
Engineering companies	Requirements management, Engineering change management, Risk management methods (project and product related such as FTA, FMEA), TRIZ, Design for Manufacture and other DfX guidelines, Function modeling, Patent analysis, Design reviews, Technology roadmapping, SCRUM, LCA
Used by both groups	Brainstorming, Requirements lists, Use case modeling, Prototyping methods

After reformulating the questions, a set of typical methods could be identified. A difference was observed between the small design studios/design consultancies and the engineering companies. While both groups used methods like requirements lists or ideation techniques such as brainstorming, many specialized methods were used only by one or the other. Examples of the methods reported by both groups are listed in Table 2.

Discovering new methods

When considering new methods for adoption into their process, interviewees working in small studios and consultancies where individuals usually work alone or in very small groups, could only consider methods that would accommodate small group or solo activities. For larger groups in engineering companies, the interviewees reported that often multiple designers with different specializations (e.g. mechanical engineering, systems engineering, software design, service design) collaborate and all collaborators needed to understand the method to be adopted, and were therefore limited to considering methods that were easy to understand across these disciplines. In addition to these constraints, interviewees from both groups reported that they were more likely to search for methods that support activities that are performed individually.

Designers working in design studios/consultancies were searching for a variety of methods including methods that detail activities outside their core competencies, such as creating a business plan. Engineering designers were usually looking for highly specialized methods that support them in creating results of higher quality and in handling the high complexity of the product under development (e.g. new modeling approaches). However, both groups primarily search for methods based on the required intermediate deliverable – i.e. their searches are outcome driven.

Furthermore, the interviewees' searches were often for specific advice on choosing new suitable approaches, or modifications of their current approaches, rather than for specific methods by name. The search for specific methods was difficult, as names of methods and terminology used in typical resources often did not match the terminology used in the companies.

During the interviews two groups of 'method users' were identified. The first group was continuously looking for new methods that provided them benefits and created variation in their design approach, generating new results and avoiding fixation and routine. The other group only searched for new

methods if they were faced with a new problem in a project or observed repeating problems that required a change of the design approach.

The interviewees belonging to the first group (six out of eleven), which is continuously looking for new methods, work in design studios and design consultancies (see Table 2) with only one interviewee working in an engineering company.

Even though the larger engineering companies were more likely to have a conservative attitude towards the implementation and search for new methods, once they faced a situation where they needed a new method, they invested more effort into finding a suitable method. In addition, larger companies invest in professional support and training once they are convinced learning a new method is worth the effort. In these cases, the interviewees usually had a good overview of relevant methods that might be appropriate, but had special requirements that were not satisfied. As a result, some of the companies started developing their own methods.

Selection of methods

Design method selection was usually done based on a few considerations of the interviewees:

- Availability of required resources;
- Impact on the design process;
- Required expertise/competence;
- Expected financial benefits;
- Personal benefits from applying the method;
- Management support;
- Experience with similar methods and gut feeling;
- Recommendations of colleagues and peers.

Only in a few cases were specific guidelines used in the selection of new methods. Those interviewees that reported the existence of guidelines for method selection mentioned that these were only relevant for methods that would have a major effect on the design process or result in high costs for consulting, training or software to implement.

If a larger change would be caused by the implementation of a new method, usually an estimate of the expected benefits in terms of time savings or quality improvements was required. None of the interviewees reported that such estimates were reviewed after the implementation of new methods, however.

The most important criterion for the assessment of a method seemed to be the efficacy of a method. Despite this, such assessments were usually done informally.

In general, methods had to fit into the existing process, as the designers were usually unable to propose major changes in the process and realization of the need for a specific new method usually happened during the middle of running projects. Methods proposed by board members, required by customers (often the case in an B2B context of engineering companies) or by legal requirements (mainly documentation such as ISO) were used without assessment.

Sources for discovering new methods

The interviewees reported the use of a variety of different sources for discovering new methods. Typical sources were:

- Industry peers
- Coworkers
- Professional working groups
- Academic contacts
- Consultancies
- Web searches
- Web repositories
- Literature (mainly books)
- Customer recommendations or requirements

Most of the interviewees used web-searches and books to find and learn more about methods, but journals were seldom used (and only by a few interviewees with an academic background). During the interviews it became apparent that interviewees felt that textbooks and other resources were not helpful as the methods are presented in way that does not match the way they usually search for suitable methods. While most resources organize methods based on a generic process description, i.e. matching process stages and design activities with suitable methods, practitioners search based on the desired outcomes.

The most important source for new methods, however, were the personal contacts of the interviewees. These included coworkers, peers in other companies (sometimes even competitors collaborating in working groups organized by professional associations), as well as contacts in academia.

Interviewees trusted advice they gained from their colleagues and contacts, with whom they could share the specifics and context of the problems they faced, over what they might find in web-repositories. In addition, it is likely that the "search" through coworkers and peers is preferable because it is not limited by the mismatch in search approaches – i.e., peers can consider the desired outcomes more easily.

Adaptation of methods

The interviewees reported that they usually adapt a method to better suit their individual needs, i.e. to fit better into the specific context. Besides a better fit they usually aim to simplify the method in order to avoid activities that do not obviously create value in that particular application. Overall the interviewees described their approach to adapt design methods as an opportunistic usage of methods with sequences of intuitive modifications and sequences of actions.

One interviewee pointed to a problem in adapting methods. He said that for adaptation, a deep understanding of the method, its rationale, and its ideal application are required. Without this deep understanding, a simplification of the application might result in undermining the effect of the method, thus resulting in inferior outcomes.

4.3 Sharing knowledge

Six out of the eleven interviewees used methods that were developed within the company they were working for. Three of them can imagine sharing their knowledge about that method. The motivation for doing so is not purely altruistic. The interviewees believed that sharing new methods with peers could contribute to their companies' reputations in the field, and considered it a smart way to get feedback from experts that may lead to further improvements, thus contributing to their own business.

Interviewees from consultancies were concerned about intellectual property rights (IPR) and with reputation building. They did not think sharing such knowledge made sense because first, that knowledge is their main capital; and second, because every method is tailored to a specific context, sharing it would not be useful for other designers who did not have the relevant experience.

Interviewees from engineering companies in contrast were mainly concerned with improving their products. If they see sharing as a way of getting knowledge and feedback from peers, they were willing to share. IPR and protective attitudes could be observed - but even members of engineering companies with such an attitude can imagine sharing. Other interviewees countered that sharing in-house developed methods would help competitors.

Asked for their willingness to share their experiences in using and adapting methods, seven participants could imagine doing so, one of them doubted whether his company would allow him. Every interviewee said that (s)he was interested in learning about the experiences of others, and that they usually follow and seek advice from known peers and coworkers or friends. This kind of information is highly valued, so they are willing to share their own knowledge with people they trust, but less so with people in general.

It was reported that in some industry sectors it is common practice to have working groups that report good practice, new methods and issues. Sometimes this is done informally between peers and friends. Many companies do support that kind of exchange, in order to improve their own practices, learn from others, and ultimately improve their products.

5 DISCUSSION

Mismatch of approaches for discovery and method presentation in textbooks and web repositories

Several platforms of design methods currently exist, including textbooks, design toolkits, publications, and a range of community-supported web-portals.

The interviewees pointed out that there is a mismatch between the way methods are provided and described in textbooks, online platforms, and other resources compared to the way practitioners search for and pick methods. Practitioners search for methods based on outcomes. Contrary to that, the current search paradigm for method platforms is based around either the name or the process stage of the method. Such a paradigm does not lend itself to method exploration or discovery. Thus, in order to ease discovery of methods, it is necessary to adapt the search algorithm to the way practitioners search, i.e. adopt an outcome-based presentation of methods.

Another shortcoming of existing resources is their focus on pure descriptions of design methods, even though practitioners participating in this study were searching (in addition to the method description) for experiences of individuals with similar background and context (i.e., those developing similar products in design engineering; or those in their particular community of practice, such as industrial design).

Providing both a description and example experiences of peers would be highly valuable and might lead to more widespread use of the provided methods.

Personal contacts and trusted relations dominate the search for new methods

For most of the participants, personal contacts such as colleagues, peers, and people they trust are the most important source of new methods. Recommendations from trusted associates dominate the search for new methods. Web search and literature studies are time consuming, firstly because of the mismatch between search behaviors of practitioners and the algorithms embedded in such sources. Secondly, because many web repositories are of low quality in terms of describing methods with sufficient detail and clarity and are thus not helpful, and are often completely rejected out of hand. In contrast, the dialogue with colleagues and peers is more likely to result in a useful recommendation, as these groups understand the context in which the method will be applied and are able to exclude unsuitable methods by referring to their own experiences in using and adapting methods.

Sharing experiences is easier said than done

Stories about using methods and deriving useful adaptations were considered helpful and valuable by participants of the study. Though all were interested in experiences of other practitioners, sharing their own experiences is not a matter of course. Four were not willing to share and one participant would like to but cannot imagine that the company he is working for would allow this. Some of the participants explicitly said that sharing experiences must lead to some personal advantages for them to do it, in contrast, others would like to share to help other designers, i.e. support their community of practice, without expecting a benefit. Motivations and concerns are manifold, even in this small group.

A possible explanation for the reported concerns is the lack of a sense of community or connection with the people who may benefit from their sharing. We expect that this will become especially important when practitioners are asked to share failure stories or problems in applying methods (this was not explicitly discussed with participants).

Many of those interviewees that responded positively regarding sharing their experiences have benefitted from the shared experiences of other practitioners before. The existence

of a trusted personal network might enable the sharing of a practitioner's own experiences. However, this needs to be studied in more detail in order to understand enablers and barriers for better sharing practices.

Though some interviewees were willing to share, all were concerned about the effort related to sharing when it comes to using web-based systems. It is easy to talk with peers, but writing to an anonymous audience is difficult. Simple rating systems and questionnaires could be a solution, or cultivating a sense of *community of practice* as discussed earlier may also help; here we need further research to understand what exactly needs to be shared for an experience to be useful for others. In a direct dialogue this is no problem, as the storyteller can pick up cues from the situation, and the listener can ask clarifying questions to help guide the depth and type of information that is shared. However, ratings and reviews lack this context, and thus may need a more structured elicitation. We can learn from web-forums where similar exchanges are currently occurring, which may also help identify what designers are interested in the most. We can further investigate what is useful to a broad audience by testing multiple versions of method presentations and recommendations. We leave these studies as future work.

6 CONCLUSIONS

This explorative study was aimed at learning how design methods are discovered and evaluated in practice.

The interviews provided valuable insights into the way practitioners search new methods and about the problems they have resulting from the way methods a presented in academic literature. While literature usually guides the exploration based on a generic design process representation, practitioners search based on desired outcomes. In order to provide a better support for the discovery of new design methods such outcome-based search algorithms need to be developed.

It was also reported that the most valuable source for new design methods are personal contacts, i.e. co-workers and peers in industry. The advantage of communication with peers is, that experiences were gained in a similar context, thus are more likely to be relevant for the person searching for advice.

The interviewees confirmed that practitioners have a need for exchanging experiences in applying design methods in a similar context, i.e. are interested in methods with a proven efficacy in a similar context. Efficacy of methods was reported to be the most important criterion for the assessment of design methods in practice, even though such assessments are usually done informally.

Smaller companies and design teams, as well as practitioners in large engineering companies searching for information on highly specialized topics, might benefit from access to a wider community than their personal contacts, in order to get advice and learn from the experiences of peers. A web-based community of practice is a potential means for discovering new design methods and developing the proper mindset for method application by allowing a context-specific exchange of knowledge between peers, and with academia, i.e. creating the missing link. However, before implementing a web-based community of practice, a couple of issues need to be solved. While community based web platforms can offer the functionality to support this way of searching advice and exchanging experiences it is important to understand how to build trust in such a community. A further challenge will be to build a critical mass, and to reduce the effort required for sharing knowledge.

These challenges motivate further investigations. In a next step we will expand this study by involving companies from the US.

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