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Investigative Designing:

usage-oriented research in and through designing

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Abstract

In this paper, we discuss the practice of *investigative designing*. The notion is currently being used to denote a variety of ideas in design research, and we first seek to clarify some of them. We then present our own, specific take on this notion, while acknowledging that it is being used broadly. We adopted the notion as an umbrella term for our combined research and design activities: as investigative designers. We use it for the exploration of how designers can integrate designing and researching within a design process. The two main concerns we are pursuing within this are to clarify the role of a designer with research skills, and to explore the implications of a usage orientation in design. We present two studies in this paper in which we investigated how usage research for design can be specifically geared to the needs of design, and what helps designers (and what does not) in designing with usage information. In the first study, we ourselves conducted usage research, developed design ideas on the basis of that, and reflected on this process. In the second study, we observed how three other designers engaged with the same user data and developed design ideas. Our findings include that the designers tended to prefer to develop their own design ideas independently from the data, only checking or adapting the ideas to the data. Furthermore, the capacity of designers for dealing with data needs to be taken into consideration. Lastly, the form of data presentation influences how well designers can engage with it in designing.

Keywords

Investigative Design; Designing; Designer; Product Usage; User Research

This paper first discusses current interpretations of the notion of a practice of *investigative designing*, before presenting our own, specific take on this notion. Only then does it present the research questions that inform two studies that are reported in the latter part of the paper. We hope for the patience of the reader with respect to this structure. We adopted it because a discussion of the notion of investigative design practice seems of use at the present time.

An investigative design practice

Having discovered early in the 1990s that “the biggest questions facing companies lay, not in the resolution of specific design problems but in creating completely new products and services”, Rust and Fisher (2003) and colleagues gradually developed more research oriented content as part of all levels of design education right up to PhD. They suggest that “investigative designing” fosters “the embodiment of new knowledge in the practical outcomes of designing”, and can “be seen as a progressive approach to professional work”. They found that this produced “a greater variety of ideas and directions and the industrial partners found these outcomes much more helpful in informing their strategies for product development.” They describe two ways to view integration of design and research in their postgraduate programme: “investigative design practice (MA Design) and the use of creative practice as a research instrument (MA Research)”.

Durling and Niedderer (2007), in contrast, promote “investigative designing” as the use of creative practice as a research instrument, emphasizing only one of Rust and Fisher's concepts. Durling and Niedderer define investigative designing as “the act of designing, set wholly within a research study for the generation of new knowledge”. Their concern is with design as research in the academic context, and in particular with the standards of the PhD award in the UK.

The difference between these two perspectives is that the first is interested both in research within design and in design within research. They seem to describe the former as “investigative design practice”. The second perspective, in contrast, is interested in design within research only, and they describe that as “investigative designing.” This illustrates that, as yet, different researchers interpret the notion of investigative designing/design practice differently. Is this a problem? The discrepancy in uses might be taken as an indication that it is too early to try to fix the meaning of the notion. It is in flux and developing, and more design researchers are beginning to use it in various ways.

A more general interpretation of the notion of investigative designing has recently come into use at the Faculty of Industrial Design Engineering at the TU Delft. When Roozenburg (2006) presented the new Bachelor programme of the IDE faculty at the TU Delft, one of the stated goals was to educate the *Investigative Designer*, for whom “research (is) integrated in product development projects”. With that, Roozenburg sought to indicate an attitude to be fostered in the new industrial design Bachelor students: an investigative, open attitude to design (Roozenburg, 2008). Roozenburg based his use of the notion loosely on the Dutch term *onderzoekende ontwerper*, a term that has informed discussions at the TU Delft for several years. It was never formalized in one definition there, however. Translated literally, *onderzoekende ontwerper* simply means *researching designer*. The term *onderzoekende ontwerper* has been in use in the Dutch language in the field of architecture for longer than in the field of industrial design. In Dutch use in architecture, it mostly refers to an investigation of requirements and of the potential of, for example, a site, before the actual design work starts.

Defined more broadly as an investigative, open attitude to design, investigative designing may refer to all sorts of aspects that could be investigated in relation to design, such as materials, strategy, specific issues (for example sustainability, aesthetics, emotion), the design process itself, etc. All of these aspects may become the subject of investigative design practice.

Our conception of an investigative design practice

Within that broad field of possibilities, we are focusing on a particular set of concerns. To clarify: in no way do we mean to attempt to limit the use of the term investigative designing (or ...designer, or ... design practice) to our particular research interests within it. Our intention with this paper is not to deliver a full and encompassing positioning of the notion, but rather to use it to indicate a specific attitude towards our research concerns, and then to move on to discuss those concerns.

We first published on investigative design in 2006 (Boess, de Jong, Rooden and Kanis), having worked with it in our research activities since 2004. Our concerns in developing an approach of investigative designing are two-fold.

The investigative designer as a designer with research skills

Firstly, we are interested in investigative designing as a research-informed design practice, whether in the context of academic research or in industry-based product development processes. Designers are increasingly being trained, in first academic degrees but more so in advanced academic degrees, in the production of research to a scientific standard. Our research is focused on an investigative designer as a designer with design and research skills. This may, for example, be a designer who has received advanced academic training in the course of a PhD study. That also happens to describe the situation of three of the authors of this paper. Yet it is still largely unexplored what the benefit of such a skills set might be for design, and for the investigative designers themselves. What is this designer's primary concern – is it the production of research insights, or the production of practically relevant and useful design outcomes? Can the two complement each other and yield unique insights? Some designers with advanced academic training become unsure about their designer identity. They are advised during the PhD course to separate design intervention clearly from research activities in the interest of trustworthiness of the research. This has been the experience of three of the authors. Others have used the PhD study itself to explore the particular nature of design as inquiry (for example Keller, 2005).

"Research through design" or as Archer (1995) formulated it, "research activity ...through the medium of practitioner activity" has proved a useful idea for us in formulating our current research interest. We use investigative design practice as a notion for the exploration of "how designers can integrate designing and researching within a design process: how to be an 'investigative designer'" (Boess et al., 2006). With that, our motivation is closer to that stated by Rust and Fisher (2003), of exploring the innovative potential of an investigative design practice, than that stated by Durling and Niedderer (2007), of establishing acceptable benefits of and limits to the practice. Creative explorations such as those advocated by Durling and Niedderer (2007) are not, of course, excluded from our concern.

The investigative designer as oriented towards product usage.

This is our second concern. Three authors of this paper share a second characteristic: the research skills training of each was focused on research on product usage. Approaches that have been developed in the past twenty years and that are concerned with the designers' engagement with the ways people use things, are for example Moggridge's (2003/2007) emphasis on empathy and the representation of usage information in design, and Suchman's (1987/2007) attention to the ways product usage can be different from what is expected, necessitating careful observation. We build on this work in exploring what an investigative design practice could be and do.

To summarize, our specific concerns in relation to investigative design practice are

- with the relationship between research and design within investigative designing, and
- with the attentiveness to product usage within design practice.

In the future, we hope to connect our study of investigative design practice to work that has looked at the processes used by designers in relation to the outcomes of their work (for example Cross, 2006). This is beyond the scope of this paper.

Research

In the remainder of this paper, we investigate two specific research questions that are related to the two concerns presented above.

Research questions

>If we want to gear our own usage-oriented research process especially towards design, then how does this affect our research process?

In order to answer this question, we conducted a study in which we did usage research ourselves, and also used it in own design work. We carried out these activities as investigative designers and also reflected on them.

> Observing other designers, what helps them (and what does not) to design with usage information?

In order to answer this question, we conducted a study in which we provided usage research data and findings to other designers and asked them to design with that information. So we looked at what helped them (or did not) to design investigatively, albeit in quite a focused setting.

Both studies were part of an ongoing research project we have been conducting since 2004. They have been partially reported separately before (Boess et al., 2006; Boess and De Jong, 2007; De Jong, Boess and Rooden, 2007). In presenting them together here, and in answer to the research questions posed, we hope to further explore the concerns presented above.

These two studies were conducted consecutively, and were connected to each other: in the first study, we conducted research with users in their homes. We designed with the data and findings that resulted from that research. In the second study, we used the same data again, but asked three previously uninvolved designers to work with them.

Study in which we analysed and used usage data in designing

This study is presented here in order to answer the question of how we can integrate usage research and design in our own practice. For this study, we decided on a design task that would allow us as designers and researchers to include self-observation as a method, and to reflect on the ways our research in people's lives is attuned to our design activities and decisions. The design task is: visual reminders in people's homes. We look at person-environment interactions within that task domain, and the ways those reminders are being given form by people, as calls for action. And we set up the project as the beginning or generative phase of a design process, with research and design as the first step, in order to explore the benefits of working with usage-related insights early on.

Six interviews in the participants' homes

Each team member visited two households and conducted semi-structured interviews. Participants were asked to give us a guided tour through their house, to show us which visual reminders they used, and to explain the interactions related to these visual reminders. When arranging the visits, we didn't tell people what the topic of the research was, to prevent them from arranging things especially for the visit. We looked at instances where people were dissatisfied with their current situation, as these would yield opportunities for change. We also looked at experiences in the past, when had something gone wrong? And we sought to draw out the dynamics of peoples' activities: what did people do to tune their environments to fit with their (desired) ways of life?

Usage data analysis and idea generation

We had a number of (shorter and longer) team meetings. Each team member acted as spokesperson for the two households we had visited. Our discussions were led by examples from the data, and by concurrent sketching. Having conducted the research presented above, we investigated how we as designers interacted with the data in developing ideas. We did not analyze them first and only then began to design. Rather, we developed ideas from the start, even while we were still analyzing the data. We made the data from the home visits available to ourselves and to each other in the form of video-clips, transcripts, video-stills and photos (see Figure 1). We did not record these meetings on video. We reflected on the artifacts we used and produced, and made verbal and written reflections on our process to ourselves and to each other.

Results

We found that as designers, we interacted with the data in two ways: firstly, by engaging directly with wishes, problems and ways of use that we encountered. Secondly, by taking more analysis steps with the data in a design-oriented way.



Figure 1: Project data overview and detail photos from home visits.

Engaging with wishes, problems, ways of use

An example of how, in some cases, we engaged *directly* with people's wishes, problems or ways of use: the piles of paperwork (see Figure 2). In our visits we encountered dinner tables with piles of papers on them, and also one dinner table that (it was revealed) had just been cleaned up for the visitor, normally being covered with papers. Although the specifics of these piles differed from person to person, in general they consisted of incoming mail of various kinds. The piles were visually prominently present, but often did not serve the function of visual reminding very well. Only the top of the pile is actually visually available. When leafing through a pile, certain items that had drowned in it surprised participants. Participants also remarked that these piles compromised their interior decoration, though not all were worried about this. The participants' attitudes to their piles of paper ranged from dissatisfaction via indifference to acceptance. Some wanted the piles cleared up, some wanted them contained, and some simply wanted them to be more usable. Our design ideas, in response to that, also varied in the ways that people could use them. Ideas were, for example, adding visual or auditory tags to piles, hiding piles in containers, modifying piles from horizontal to vertical to allow for easier searching, or aiding the reduction of piles by considering what would be more appropriate places for them in a house. See also Figure 2.

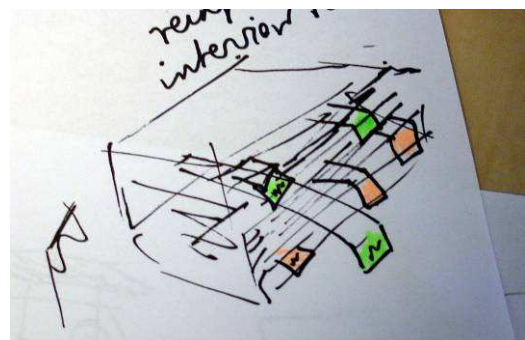


Figure 2: Piles of paperwork, dissatisfactory reminders, and a design idea: a box for papers, with coloured strips to indicate certain deadlines or reminders.

Design-oriented analysis steps with the data

Besides these direct reactions to specific problems found, we also made a more encompassing analysis of the data. Working within a tight time frame

and with a stated intent to gear the analysis towards support for designing, we found that the time it took each of us three to make the required steps for a thorough qualitative analysis, was already slowing us down. We developed techniques to overcome these delays.

In this, our motivation as researchers remained to still do the data justice – to not just design from our own ideas, but also to work with the data in a manageable way.

Two of the techniques that emerged from this approach are described in the following.

Technique: design-oriented theme generation

At the point when each researcher had conducted their two interviews, produced transcripts and photo selections, and had made a first coding, we held a collaborative session in which each of us used their data as input. One of us had also pre-brainstormed on a list of potential themes, to get the session started. We did not generate the themes with the aim of purely *describing* and *interpreting* the phenomenon of visual reminders, which would be a standard qualitative analysis approach. Rather, we generated the themes with the aim of including the design insights and design ideas from each researcher right away, and noting these on differently coloured post-its (Figures 3.) In the session, we gradually built up theme clusters by placing post-its on a whiteboard, and by writing and drawing on it. We also shared some data and emerging themes by re-enacting interactions we had observed or heard about in the homes. The larger themes we identified as relating to visual reminders in people's homes were as follows:

a: actions around visual reminders, for example being made, timed and displayed, with the reminders being about people and things being moved, sometimes in and out of the house;

b: activities being timed, prioritised, postponed or missed, the actual reminding succeeding or failing;

c: people's desire to have a certain style of interior, some even using visual reminders as interior design elements, or, in contrast, visual reminders compromising the interior or drowning in other elements of the interior;

d: people's attitudes to visual reminders. Attitudes could refer to pleasant, unpleasant or neutral activities ahead. Visual reminders sometimes formed part of people's striving for cultivation or well-being, and sometimes belonged to a semi-conscious semi-engagement with objects or people: a necessary evil;

e: lastly, we made two lists, one consisting of kinds of visual reminders such as things themselves, lists, or combinations with auditory reminders, and another one consisting of activities that the visual reminders were about or for, such as phoning someone, things to shop for, or things to do. (See Figure 3.)



Figure 3, left: Detail of themes of different types on a whiteboard. Yellow = phenomena (themes or insights), pink = problems (of users), blue = visual reminders themselves, pale pink = design leads. On the right: Impression of our design ideas: a watch to speak reminders into, a 'smart shelf' where things to be remembered would light up, a 'reminder-rhyme' that includes the most important things to have on the person.

Technique: rough coding

Having established the theme overview in the collaborative session, we experienced a delay when each of us was then trying to structure their photo and text data according to the themes identified. Standard word processing software didn't let us do this quickly. We didn't want to move on to specialised qualitative analysis software but rather stick with the design process. The bottleneck was resolved by introducing a technique we termed rough coding, consisting of the following steps: first, one of us marked up his interview transcripts for salient passages, then copied those salient passages into a new document, leaving out the visual information. He gave codes to the contents of the theme structure that we had derived collaboratively. For example, "actions around visual reminders" was theme "a", and within that, "seeing the visual reminder", theme "ab". "Activities being timed" was theme "b", and within that, "estimating the priority", theme "bb". Then each of us only checked whether all the theme codes were present in the summarized transcripts, to make sure that the rather freely derived themes were reflected in the data. See Figure 4 for an example of the technique.

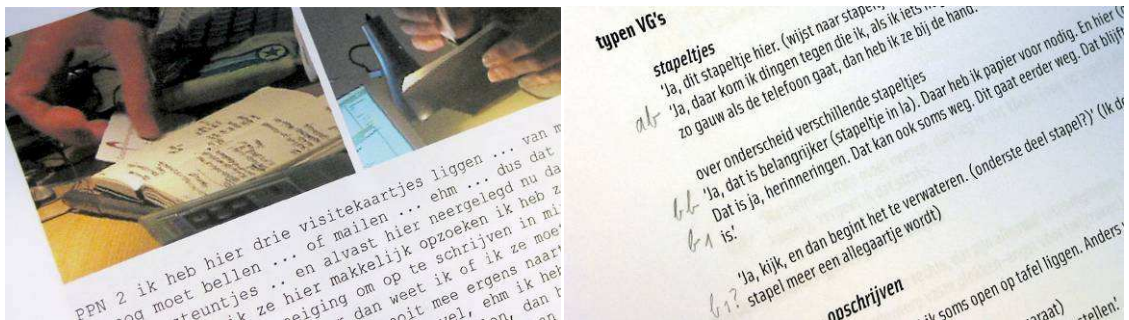


Figure 4: Top: putting photos and text data together caused delay. Bottom: Rough coding. Assigning themes, "ab", "bb" et cetera, to transcript passages.

Conclusions from this study

In answer to the question of how we can integrate usage research and design in our own practice, a first finding from this study is that with little time available, data analysis quickly becomes cumbersome to integrate with designing. More research effort can be invested into developing small, 'quick and clean' techniques that are specifically directed towards designing, and that still provide a fair picture of the data that was generated, seeking to minimize compromises on the quality of analysis. In this study, some first explorations were made of such techniques. A starting point for further research is that the approach of investigative designing has the potential of developing such techniques. This conclusion is based on our self-observation that as designers, we felt encumbered, while at the same time being aware of the necessity of treating the data fairly. So the potential of an investigative design perspective here lies in the efficiency of being able to combine both perspectives in one person and in one and the same moment, in being able to reflect on this, and also to act on it.

A second finding is that from the wealth of possible questions to work on, on the basis of the data, we initially selected a particular problem from which to develop ideas. We did not engage with all the data. As designers, we worked in a way here that is hardly different from designing from own experience or for a single case of use. After our second reaction to the data, of analysing it in more depth and with themes showing interconnections between findings, we still did not actually continue with design ideas that tried to engage with all of that. Rather, we continued with ideas that engaged with specific findings (Figure 3). This may mean (though it is only a first indication), that design cannot actually deal with 'all' data. In that case, we should perhaps not regard design ideas as ideally direct responses to research at all. Rather, we might view them as 'fresh' models or prototypes, which in themselves can become the subject of new usage research.

Having completed this activity, we did not pursue our own design efforts further, but only used the coding to prepare the data for the second study, with other designers.

A study in which other designers worked with information from usage research.

This study is presented here in order to answer the question of what helps other designers (and what does not) to design with usage information. We invited three other designers to join us in two consecutive design ideation workshops during which usage data were presented to them. In preparation for the workshops, we developed an accessible format for the presentation of information on product use, in the form of cards and theme posters. At the end of the second workshop, we held a discussion with the designers to reflect on the experience of designing with information about product use. We recorded the workshops on video and transcribed them verbatim, except for the designing part in the second workshop (for technical reasons). The recordings and transcripts were used to analyse the statements and actions of the designers. The design task for this study was again 'visual reminders in people's homes'. See table 1 for an overview of the activities and their

connection to Study 1. See Figures 6 and 7 for an impression of the workshop situation and for the materials used in the 2nd workshop.

Table 1: Outline of the two design workshops

3 designers collecting data, design-oriented analysis, designing				
3 designers preparing data for use by others				
Preparatory task: 3 designers designing from own situation+data, 3 designers designing from own situation only.				
1 st workshop		3 days break	2 nd workshop	
3 designer researchers	3 designers		3 designer researchers	3 designers
presenting designs (research information in mind)	presenting designs		providing research information, not designing	using research information, designing



Figure 5: Video stills from the second workshop. On the left, on the presentation wall: theme posters. On the right: final presentation and demonstration of use of the idea 'E-post-it'.



Figure 6: theme cards and theme posters through which the data was presented to the designers.

Results

Designers' own experience

Throughout the workshops, the designers seemed at first to mainly use their own experience. They linked their design ideas to their own lives first, and only then linked them to the users' lives. The designers were given this opportunity on purpose. We asked them first to develop design ideas, and only then presented them with the user data. Our intention in this was to see if and in how far they would adjust their ideas once they did see the data. All designers talked vividly about what they encountered in their own homes and how their design would work for them. For instance, a designers' idea was a curtain made of long strings with items attached to it that had to be remembered. One could place it in front of the entrance door's opening, and so pass through it on ones' way out. She drew the curtain in her own broad hallway at home, see sketch on the left in Figure 7.

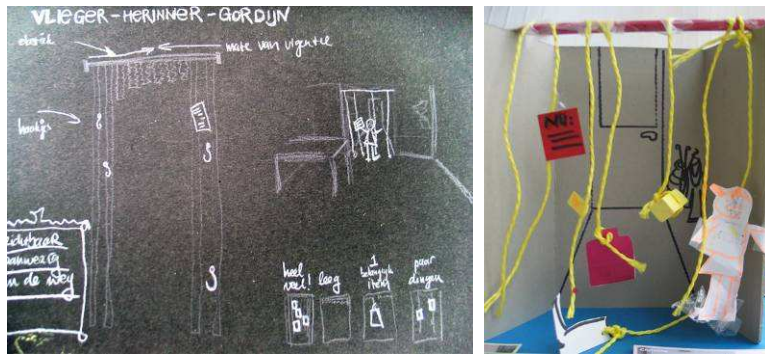


Figure 7. The Fly Curtain: A designers' first idea and the final model. The rough sketch on the left shows the first idea of a curtain made of long strings, to attach items to. These could then be remembered when passing through the curtain on the way out. The photo on the right shows a functional scale model of the idea, made in the second workshop, with personalized strings.

Connecting with data in terms of content

While the designers preferred to develop their own ideas first before engaging with the data, they did find it important to connect with the data. When they were presented with the data, the designers tended to pick data to work with that were related somehow to their initial idea or that were in conflict with it. One of the three actually decided not to use his initial idea but used the cards to start working on a new idea.

The designers actively sought more information from us, the researchers, about the data. They asked the researchers questions about some of the situations shown on the cards, and about underlying reasons given by participants. In the example of the curtain with items stuck to it, the designer thought about situations with children who might run into heavy items and hurt themselves, or that they might want to have a string of their own. In the second workshop, she collected cards about families with children and used them in the designing part. She particularly focussed on the card showing a narrow hallway packed with coats and bags, see Figure 1, bottom photo. She tried to understand how the families lived and began to categorize their

behaviour in terms of tidy and messy. She explained that this connected with her own previous interests as a designer. In her final presentation, the designer emphasized how her design would be used in families with children (see photo on the right in Figure 7). She added a roll-up mechanism in the curtain so it could be removed when needed and she made it possible to personalize the strings by using colours and placing them at a lower height.

Our pre-categorization of the user data into themes did not help the designers in their work. The short time that was available to take a close look at the data only provided them with the opportunity to read the individual cards, but they did not grasp the meaning of the themes. Making themes is considered to be an important step in the process, according to another of the designers, which he feels is necessary to do himself to gain a deeper understanding. He suggested that it might be better to let designers work themselves with the unstructured data of users and make themes during the workshop.

In some respects, the designers felt that they did not get enough information from the data that was presented. For example, one designer seemed to notice a shortage of background information, at least for him, when he mentioned that "I can see what they do, but I don't know why". And further "the cards reflect what people do now, but not how they want things to be". In the evaluation this designer mentioned that he could not grasp the full picture of a person. He suggested that it might be better to present user data in personal profiles. The designers stressed the importance of context information on the cards in order to check their interpretations, such as cupboards being neatly cleaned or crowded with stuff, but that they did not need more personal information, such as participants' faces.

One designer mentioned that the examples were close to her own experiences, so in that sense the information was not 'new' to her but more an expansion to her own set of data on this topic. That way, she could make use of the data to alter her initial idea.

Another designer suggested that for him to trust the data, it should consist of things that he is familiar with and also new things that differ from his own experiences.

However, one designer explained that he had to exclude people with families for which his design is not suited according to him. In the evaluation after the second workshop he said that it is important to make choices as "You cannot integrate all information in one idea". So you have to choose and then it becomes clear which cards are relevant for you and which are not. Here, the designer indicated specific situations that could be included in the design, but also other specific situations that were excluded.

Connecting with data in terms of presentation and form

When working out their ideas in the second workshop, the designers worked with the data not only in terms of content, but also as artefacts that could be used to illustrate their designs. One designer used one of the cards (Figure 5) as visual background for a sketch. Another designer used photos from the research showing piles of paper, to present and argue his new electronic device to simplify finding pieces of paper (Figure 8).



Figure 8. Piles of paper as inspiration for an E-post-it idea.

This designer, too, engaged with the problem shown in the research data of papers piling up in the house, and related it to his own life. As did the designer with the Fly curtain, he also used the card and rough models in the presentation to show and act out how his idea would be used by participants of our research (as can be seen in Figure 5).

The third designer used several cards to identify herself with her chosen usage context, by pinning the cards to her shirt while presenting her design ideas. She also re-enacted the usage actions that she foresaw to happen with her design.

Conclusions from this study

In answer to the question of what helps other designers (and what does not) to design with usage information, the conclusions from this study are as follows: since designers developed their own ideas first and were then reluctant to abandon them again, a conclusion could be drawn that designers should be prevented from having their own ideas first, so that they still stay open to develop ideas from the data. But the designers clearly stated that they preferred it this way: one designer said in the evaluation that “if we would have taken the user data as point of departure, I would never have come up with this idea” of a curtain for a whole family, see Figure 7, “because it (was initially) a one-person household idea...” Another designer even suggested that he would even prefer to receive the data later: he might use it, for instance, for detailing a final idea, and also to cut away unnecessary features. Our conclusion here, then, is that ideas can be developed first, and then further developed using usage data. Importantly, though, the information on product usage needs to be at the right level and of the right kind so that designers can engage with it. Designers need to be able to apply their own categorizations and interpretations to the data. The data needs to be of enough depth and contextuality. In our research, the data did not seem to be overwhelming: the designers seemed to feel they could have handled more. In any case, they made selections from the data: they chose one or two specific situations of a user that they could relate to from their own experience and worked with those. They acknowledged that it was not possible to design for all the data, and that they had to exclude some. A point for consideration for the designers was also whether the data could be trusted. Concluding, lastly, on the presentation of the data, the flexibility of the cards as artifacts was clearly appreciated and taken advantage of by the designers. However, the static nature and brevity of the information presented on the cards, was a

drawback for the designers. Other presentation formats would be needed in order to overcome this.

Conclusions

Both studies reveal each from their own angle, the preference of designers to develop their own ideas first and to only complement them with data from research. This aspect has been discussed before, not least by Cross (2006), and we should examine our research further in the light of findings that already exist there. If we attach a lot of value to a good alignment of design ideas with the usage situation, it seems that it may be a better route to just develop ideas and to then treat them as prototypes and investigate them thoroughly in relation to a use situation. This is already exemplified in arguments and approaches by for example Rooden, 2001; Suchman, Trigg and Blomberg, 2002; Gaver et al., 2008, so these approaches too can be further investigated for meaningful connections. Furthermore, the cognitive load in dealing with data emerges as a theme in both studies. In the first study, where the data had not yet been 'pre-packaged', it led to us as designers focusing on detail occurrences in the data. In the second study, the presentation of the data seemed to enable the designers to scan them quickly. They were not, however, able to engage with the categorization that had been made. Neither, incidentally, were we, even though we had made it ourselves. It seems that it is more efficient for designers to take in data quickly and align it to their own experience, than to work with an abstract overview of it. Lastly, and this emerged particularly from the second study, the form of data presentation plays a role in designing. More could be done to make data contextual and at the same time flexible to use in a design session.

In the two studies in which we observed ourselves and others dealing with usage information and designing for it, we found that much can be done to gear a usage-oriented design process better towards the needs, capabilities and situation of designers.

Our studies were conducted in quite a focused way, disconnected from a real assignment situation and limited to the initial stages of a design process. In order to strengthen the initial findings from these explorative studies, we intend to investigate them further in more applied situations.

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