

# NEEDS AS A BASIS FOR DESIGN RATIONALE

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## 1. Introduction

A basic principle for Needfinding [Faste, 1987; Patnaik & Becker, 1999] is that designers and engineers should interact directly with users to get direct insights into the user domain. Needfinding is not a new phenomena, it is almost forty years ago since the process was adopted at Stanford University's product design program [Patnaik & Becker, 1999]. As the name, Need-finding, implies, this is an intertwined approach to find needs which are not readily articulated by users.

The application of a Needfinding process offers qualitative methods to make those needs visible early on in product development. In fact, the process has become more interesting during recent time, since qualitative methods have gained more acceptance outside the academic realm [ibid.]. The word qualitative indicates that what are sought for are qualities such as people's experiences, what they perceive or interpret into a situation [Miles & Huberman, 1994; Patton, 2002]. Such data is contextually dependent, i.e., it must be generated in the context in which the phenomena occur. Besides context, people's activities, behaviours and goals are important to observe and learn from.

The objectives, for applying Needfinding, are to make the identification of needs and design a seamless effort, as well as an interest to identify opportunities to innovations. Needs last longer than any solution [Patnaik & Becker, 1999], since they are grounded in people's activities. The solution and product that might meet such needs change over time. One example is how to store computer data, the products which satisfy the need has changed from, e.g., punch cards, magnetic tape, floppy discs [ibid.] to USB-flash memories.

A guiding methodology in Needfinding is a flexible process, which is adapted to the task at hand [Kelley, 2001]. Such a process is conveyed in a few basic steps and, builds on a 'philosophy' which permeates all activities in order to adapt the process according to the project. Therefore, the designer's ability to rely on such a process depends on familiarity with a number of methods for observations and interviews, as well as an aptitude for socio-technical skills.

Hence, the purpose in this paper is to present and reflect on methods used in a running development project to identify needs in a product development project. This is done to contribute to the advancement of a need driven product development process.

The disposition of this paper is as follows. First, our approach in studying the need identification activities is presented. Second, a theoretical frame for need identification and design is presented, i.e., Needfinding [Patnaik & Becker, 1999]. Third, the practice of finding needs is outlined and discussed.

## 2. The area of interest and research approach

The study presented here is part of a European Union (EU) funded project called NeedInn (stands for Needs and Innovations) [Larsson & Larsson, 2007]. A main objective for the NeedInn project is to contribute to need oriented product development processes within e-health. Those who benefits from the project are care givers, care takers and solution providers. The motivation for the project is the

recognition of the potential benefits of a need driven process. Though, methods to identify and communicate needs into products development aimed for healthcare were perceived as missing.

The NeedInn project has run for 30 months. In general, background and empirical data for the study presented in this paper has been generated during the daily work of need identification activities within the NeedInn project. Observations (e.g., shadowing), participative observations and interviews have been performed. The context for the data generation has been participation in staff meetings, everyday work, scheduled focus groups and workshops. In general, principles for contextual inquiry [Holtzblatt & Jones, 1991], has been applied. In short, these are, context is important, the users are recognized as experts of their work situation and the interviewer/observer should be aware of focusing a combination of assumptions, beliefs and concerns of a particular situation [ibid.].

The form of data generated by participation in the healthcare activities is mainly qualitative, e.g., an interpretation of something in the context where it occurs. Qualitative data are aimed at producing a 'rich' and 'contextual' understanding of experiences, rather than scientifically verifiable results. The justification for such an approach is that it may provide a rich understanding of rationale in a way that would otherwise be impossible using conventional methods. This is a description of the methodology for a need-based approach; however, the focus on qualitative data is also applicable for the generation of empirical data for this study.

In particular, empirical data for this study has been generated in two workshops and in follow-up interviews with the development company, the designers and the project team leaders.

### **3. Needfinding**

Besides looking for needs, a main principle is to make the identification of needs and design 'seamless', meaning that the Needfinder (e.g., a multidisciplinary team of Needfinders) is involved in both studying people and conceptualising new products [Patnaik & Becker, 1999]. Looking beyond the immediately solvable problem is suggested, since the problems which are not currently solvable can be fixed in the future. Therefore, it is useful to make the findings tangible and prescriptive. Further, the findings are better understood when supplemented with drawings, photos, audio recordings and/or video [10]. Behavioural mapping, where the Needfinder spends two or three days within a space and taking photos of people, and camera journals, where users are asked to keep visual diaries of activities are two examples of methods that generates photos of situations in which needs can be identified [Kelley, 2001]. It is recommended to go through many quick passes to study people, rather than one long effort. Doing so, design work is allowed to proceed in parallel with the Needfinding activities [Patnaik & Becker, 1999].

The principles of Needfinding are manifested in a four-stage process for studying people [ibid.]:

1. frame & prepare, involves decisions about, e.g., the scope or coverage of the project, the goal of the study and the definition of the people to be studied,
2. watch & record, include observations and documentation,
3. ask & record, include interviews, or simply asking questions, and documentation,
4. interpret & reframe activities to interpret and analyze data to identify needs, which in turn, reframe the project scope or coverage.

The importance to use a combined effort of observations and interviews is because observing people alone cannot convey everything, asking people adds information. These stages should be reframed and repeated to provide an increasing level of focus and detail [ibid.], such iterations should be series of quick iterations rather than a long effort [Kelley, 2001].

An interest in really understand the user and the constraints the user perceives, the application of a variety of techniques, the presence in a real-life situation and visualisation are basic principles for need-based approaches [ibid.].

### **4. A practical view**

The application area for the NeedInn project is elderly care, thus studies has been performed, for instance, at elderly-care homes, home-care services, physiotherapists, general practitioners and local authorities responsible for those services. One person has been engaged as both a project leader and, initially, as the main Needfinder. After performing shadowing, observations and interviews a number of interesting need areas were found. One of these areas was expressed by the nurses in terms of a perceived problematic situation of sharing everyday information related to the care of the elderly. Therefore, to gain insight into the identified problematic situation, a focus on such information was framed in order to perform an iteration of observations and interviews.

Information about the elderly's daily situation was written down by hand in a case sheet. This information was mainly concerning the medical state. Information that had to do with the wellbeing of the elderly, but with little medical relevance is in general not documented. Thereby, not easily available. However, this information is of substantial value particularly for the care givers, i.e., nurses, but, also for relatives. Relatives find this information important because it tells them something about the wellbeing of their elderly relative. This information cannot always be provided by the elderly themselves due to, for instance, poor memory or difficulties to communicate. The relatives become dependent on the nurses' observations and time to tell them something about the elderly person's day.

A staff information meeting is held every day between shifts to exchange information about these issues, e.g., if a care taker has been unusually worried during the night or if somebody is unusually talkative, thus needs special care additional to medical treatment. These staff meetings last up to one hour, time that the nurses perceive valuable to spend giving care instead. Information from these meetings was sometimes written down; these notes were found as difficult to read.

Coming back after a time off or holidays, the nurses have limited possibilities to catch up information. Further, to provide information for substitutes was found time consuming, but also difficult. This was because the nurses said that they have to rely on their memory. Some written documentation was stored in binders it was, according to the nurses, difficult to find specific information in those binders.

Framed by the theme information, this iteration yielded a list of need statements:

- Everything at the same place
- Readily available and easily accessible
- Indications of new information
- Brief up to date information
- Catch-up information

Besides a need statement list, the Needfinding activities yielded identification of key persons to invite into a series of workshops. The goal for the workshops was to make a number of quick iterations to identify and refine needs and to find solutions to the identified problematic situation. In the workshops, the key persons from elderly care were nurses and management.

#### **4.1 Workshop I**

In this workshop, the information sharing problem area was in focus. The workshop mode was set to a fantasy phase, inspired by future workshops [Kensing & Madsen, 1991]. The users were encouraged to have 'if everything is possible ...' in mind. In relation to the need area of information sharing, a documentation system evolved as a solution space. Thus, an issue which was discussed in the workshop was how information was put into and extracted from documentation systems. It was found that technological devices was used, i.e., computers. However, a previously used paper card system was also discussed.

After this workshop, a solution space became apparent and the needs became more visible. It was decided to assign a design team. Two designers were contacted by the project leader, these joined the project. Having two newcomers, it became important to set them up to speed with the insight already generated in the need identification activities. In an informal meeting, the design team discussed these issues, as well as the generated need statement list was discussed. Also, introducing the designers to the user context was utterly vital. Therefore, a second workshop was performed.

#### **4.2 Workshop II**

The workshop started by introducing the two designers for the elderly care participants. The designers were assigned the task to present the results from the earlier performed need identification activities. This was done in order to evaluate if the findings were in line with the participants view of the problematic situations. In this way, they could comment and add thoughts which had been triggered since the first workshop.

Thereafter, the second workshop was designed as a future workshop [Kensing & Madsen, 1991]. The basic principle to interact directly with people and/or users is prevalent in future workshops. That is, a future workshop should include people who will get in direct contact with the product that is going to be developed [ibid.].

A future workshop runs in three phases. First, a critique phase, to highlight specific problems about the practice, 'as-is'. This phase generates a view of things to change. Second, a fantasy phase takes place to imagine a number of 'to-be' scenarios. This phase turns the result from the critique phase into positive ideas and generates preferred changes. Third, an implementation phase sorts out what changes that are feasible and realistic [ibid.]. To get the most out of the workshop a clear topic or theme is recommended. The themes were set by the project leader; they were information, documentation and dissemination. The workshop generated rich and deep data about the chosen need area, its context and perceived constraints. The critique phase, rendered in a list of need statements, this time more focused towards a technological solution:

- Not an additional device to carry around.
- Enter information vocally and/or by other input devices.
- Extract the information individually or in groups.
- A portable, mobile, discrete, small, ergonomic device.
- Compatible with clothes (pockets etc).
- High security-level – confidential information.
- An input-information-reminder.
- Snooze functionality for the input-information-reminder.

At this point, several quick iterations had been done. Firstly, iterations were done by the project leader in the initial observation and interview studies. Secondly, new iterations were done within the, so far, conducted workshops. Each iteration makes the design space converge towards possible solutions. The result from this workshop was discussed in the design team and rendered up into an idea for a solution based on verbal input. The decision for verbal input was made because it was in line with how the nurses actually did share information today. The project leader contacted a company specialized on speech technology to join the design team. Again, it became important to interact with potential users in their context. A third workshop was performed. This time the objective for the workshop was to create ideas and concepts for a product, therefore the third workshop can be referred to as a creative session.

### **4.3 Workshop III**

The themes for this creative workshop were decided by the design team as verbal information, documentation and audible dissemination.

The workshop started with a word association exercise. Such an exercise is fairly comfortable to perform even for people not feeling at ease with creative methods, mainly to set the participants into a creative mode. Association exercises can be done in a number of ways, but in this workshop the participants was provided with post-it notes and pens. Every participant wrote down words which they associated to information sharing, the notes was posted on a whiteboard. This generated a map conveying issues related to the topic. After this, the participants could spend two votes (i.e., colored stickers), on what they perceived was the most important issue. The chosen issue was compiled and clustered into a new topic for a brainstorming session.

The topic for the sessions was – *documentation support*. The participants were reminded of the rules, no judgment, build on the ideas of others, aim for as many ideas as possible and there are no stupid ideas. To support the brainstorming session the participants were encouraged to make sketches and write down the ideas, these were posted on the wall. The participants were told to explain their ideas to

the group when they posted it on the wall. 73 ideas came up, and these were clustered into categories. The categories were functionality, interaction, interface, dissemination, organization and artefacts. The participants were asked to make a quick and dirty screening of the categories, to find issues they thought of as essential and useful. This was discussed in terms of how they fitted into the daily work at the elderly care home. The issues to not have an additional device and that the device should fit into pockets on the work uniforms were emphasized by the participants.

#### **4.4 A Dictaphone device**

Based on the identified needs and the activities in the third workshop the concept for a Dictaphone device emerged. The contacted company could provide voice recognition software as a basis.

In general, such software is usually installed on a computer or a laptop. At first, this was also the idea. However, the software was integrated into a cell phone based on the need statements '*not an additional device to carry around*' and '*fit into pockets*'. A cell phone is part of the nurses' daily work equipment, and had the functionality needed.

At the beginning of a shift, the nurse is prompted by the software to log on to the system. This is also an identification tag for who is entering what information, as well as bringing up the relevant information. Relevant information is based on at what department the nurse will work in that shift, but also bringing up relevant information for that nurse. The latter is based on when the nurse was latest logged on. As logged on in the system, both input of new information and checking up stored information is possible. When a nurse want to input information into the system, the cell phone is picked up from the pocket and the nurse can speak directly into the phone. The information is transferred to a central server, and then indexed and stored. The Dictaphone device allows users to make verbal information input, and the software translate the input into written texts, if desired.

### **5. A need driven process**

The task in need identification activities is to make needs visible and possible to communicate within a design team. It is our experience that need statements does not convey the need in terms of the chosen words. For example, 'Everything at the same place' might be, when interpreting the words literary, a solution. By putting the statement into a context needs can be discerned; nurses running into all staff rooms in an elderly home looking in binders searching for a particular document, getting more and more stressed and feeling uncomfortable with not spending time providing good care as they are trained and hired to do, ending up scribbling down information on a note.

On one hand, to be manageable in a product development process, an expression has to be decided upon. On the other hand, this makes it difficult to communicate the need statements to others. Therefore, participation and interaction in either need interpretation discussions or direct interaction with users is necessary.

In common, need identification activities, as described here, is not used of product development companies, it can be discussed that a lack of understanding for methods generating data about qualities contributes to that. As a designer a weight, a size or a degree of something are important measurements to initialise problem-solving activities. However, need identification is not a problem-solving activity, rather an exploration driven by curiosity and an interest for human activities, as well as their worldviews, goals, efforts and means. An invaluable tool is questions like: Why? What? When? Who? With whom?

Paradoxically, a search for new solutions to existing problematic situations is a part of need identification activities, yet emphasising look for needs, not solutions [Patnaik & Becker, 1999]. The two activities of Needfinding, i.e. identifying needs and finding solutions, became apparent in the need identification activities in this project. One track focuses on the identifying activities and is performed in the potential users' context, the other track focuses on finding solutions and these activities are performed away from the users' context, see Figure 1.

Due to a focus on qualitative data, interpretation and categorization occurs along the way when doing observations and interviews. That is, a number of iterations are done during these activities in the user context. Each providing a base for decisions on the next step, as well as providing insights into new potential users and new contexts. Interpretation and categorization is done away from the user context,

i.e., when the generated material is processed and communicated within the design team. This can be done by discuss the material in relation to a context, as in the example above with 'Everything at the same place'. The work with the generated material makes the findings clear; see Figure 1, the Finding box upper right corner.

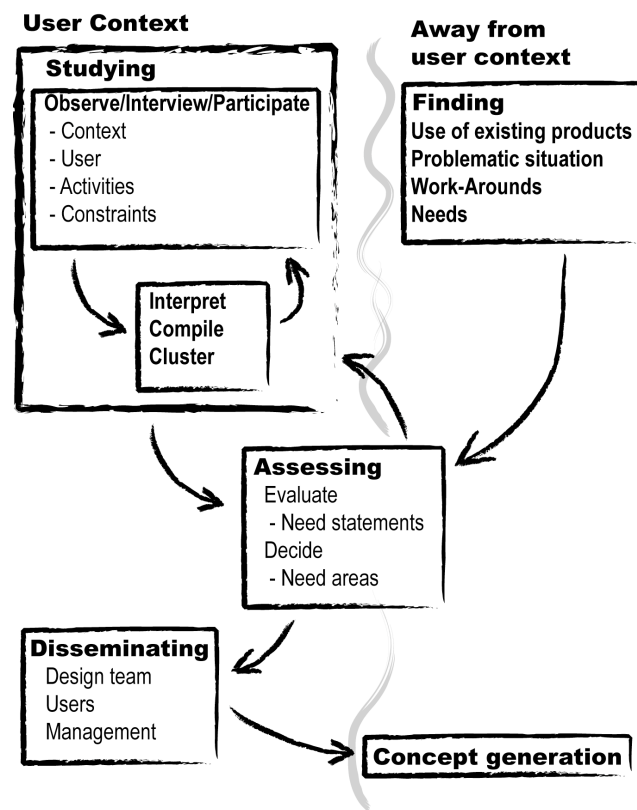


Figure 1. An overview of the duality in Needfinding.

There is a zigzagged shaded line in the middle of Figure 1; this is representing an interface between these two kinds of activities. The Assessing box in the middle represent that need statements and need areas has to be grounded in the user context, but also communicated in a design situation away from the user context.

The principle to make the identification activities and design 'seamless' [Patnaik & Becker, 1999], makes it difficult to draw an exact boundary between what is done in the user context and away from it. Still, solutions have to be suppressed and not exposed in the user context until a number of iterations have been done.

Of course, there is a client for product development projects. The NeedInn project also had a client having a particular interest, i.e., e-health, which frames the need identification activities towards information and communication based products. Though, if the aim is new products, it is important to not introduce a solution or trying to solve the problematic situation until it is fully understood. If so, no difficult-to-articulate needs can be found, rather requirements which can be expressed in relation to the suggested solution. For example, in this project the speech technology company was engaged when a need area had been decided on after workshop II. In this case and due to limitations in time, one company was engaged, but it could have been possible to engage several companies which could have suggested different solutions on the same problem. In turn, such joint effort might lead to truly innovative products.

It is important to frame and reframe [Patnaik & Becker, 1999] the need identification activities until a satisfying focus for the development tasks can be decided on. In this project, these frame and reframe activities was done after each workshop. Feedback to the users and into the user context is important to keep needs in focus. After each iteration, the needs and solutions become more and more focused

towards a product. Thus, it can be argued that it might also be a horizontal interface in Figure 1, below the Assessing box in the middle. It is also our experience that a traditional approach to product development becomes a primary process in the latter part of a project. In order to reach a need driven product development process 'needs' still has to be prevalent in the process. For example, trade-offs have to be based on what has been found in the need identification activities and potential users should be given opportunities to evaluate the product, e.g., in similarities to a participative design approach.

Access to key persons, i.e., those who are thought of as directly affected by the potential product, is an issue which is important. Further, it is important that the person/s being observed or interviewed really feels like they are providing valuable input. The interviewer must have an honest interest in what the users are doing and being truly interested to learn something from them. The Needfinding team should not provide a solution before been engaged with the users and have gained an understanding about their situation. When you, as a skilled problem-solver, think that you have the right solution on another person's problematic situation, it is easy to say; "-this is not a problem, you just... ", and suggest a solution. Doing so spoils further identification of needs. From this point of view, it might be possible to argue that a Needfinder is a role which facilitates people, e.g., social scientists, marketing people, designers and engineers, to engage in need identification activities based on their core competencies. A need identifying facilitative role can coordinate competencies in a multidisciplinary team towards identifying and communicating needs, and not to propose solutions. This role seems to be separated from the role of a project leader, since one main task for the Needfinder is to direct communication in the team to focus on needs areas and needs statements.

Traditionally, in product development ambiguity has to be minimized as early as possible. This is not the case when performing need identification activities; instead there is an intrinsic value in diversity. The objective is to increase the design space and open up for innovation opportunities. Thus, it can be argued that a need-based approach is particularly useful for innovative or new product development. But, it is also useful for improvement of existing products, since it provide insight into what improvements that are required by the users and, probing for needs gives a rationale for those requirements.

The involvement of designers and other staff from product development companies makes it possible to visualize idea concepts and needs, since the potential users become 'alive' and understandable in a need-based approach. Furthermore, a unified view of what to develop is likely to occur due to a collaborative effort in identifying needs and visualizing idea concepts. In design a shared view and understanding of what to develop is important. A need-based approach provides such a shared view, since all ideas, solutions, concepts etc are connected to needs. This shared view is built by interaction with potential users, thus the potential for the product to be accepted and wanted before launch might increase. In turn, reach the market faster.

## **6. Concluding remark**

In this paper, practical activities of need identification activities - an intertwined approach to identifying needs and to visualizing idea concepts - are the focus. These have been described based on an e-health project, where a Dictaphone device has been developed. This is done to contribute to a need driven product development process. The presented methods are strongly depending on a familiarity with managing qualitative data. A need-based approach can, due to practically dealing with identifying needs and finding solutions, provide designers with insights into such methods. In the case presented in this paper, the product development process was driven by user needs, showing possibilities for implementation of a need-based approach into product development. One benefit that has been identified is that probing into needs provide a rationale for requirements, i.e., those statements that users express. Another benefit of the study is indication of the role of a Needfinder as important to facilitate the communication of needs within the design team.

Need identification activities make the design team truly committed to needs and give needs high fidelity throughout the whole process. However, in our study we have experienced that need statements are difficult to express. Thus, studies on how to compile need statements into same level of abstraction has started. Further research concerning the use of creative methods in workshops, to encourage users to participate in need identification activities seems interesting.

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