Identifying Objectives for a Learning Space Management System with Value-focused Thinking

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Abstract: A classroom with a blackboard and some rows of desks is obsolete in special education. Depending on the needs, some students may need more tactile and inspiring surroundings with various pedagogical accessories while others benefit from a simplified environment without unnecessary stimuli. This understanding is applied to a new Finnish special education school building with open and adaptable learning spaces. We have joined the initiative creation process by developing software support for these new spaces in the form of a learning space management system. Participatory design and value-focused thinking were implemented to elicit the actual values of all the stakeholders involved and transform them into software implementation objectives. This paper reports interesting insights about the elicitation process of the objectives.

1 INTRODUCTION

The traditional classroom setting of children sitting on benches and patiently listening to a teacher is not easily applicable in special education. The classrooms are often less inspiring, and an activity-driven approach is more appropriate (Özen and Ergenekon, 2011). For example, children with hearing and vision problems can benefit from visual and physical stimulations and moving between different spaces, and children with autism disorders benefit from the use of technologies and digital artefacts that promote collaborative educational activities and attentional exercises (Alessandrini et al., 2014). To overcome these issues, a new school was recently created in Finland, the Valteri School Onerva, which was just finished in early 2016. Its stated goal was to enable functionality, physical activity, and the application of new technologies. The idea of an open and adaptable school was a focus from the planning and construction stages of the school.Under this concept, all physical spaces are understood as potential spaces for learning, not just the classroom, and the environment is dynamically adapted to the needs of the practised pedagogy. A simple example is using stairways as an active learning space: children might physically move from one stairway step to another while learning the number line, months, or weekdays (Ikkelä-Koski, personal communication, May 5, 2014).

However, the activities in the modern school environment of the Valteri School Onerva must be supported with modern technology. In the stairway example, in a regular educational setting, with the current level of support, it would not be possible to know if the stairway was already in use, as the stairway is a non-traditional learning space and would not be considered by any scheduling tool. The lack of such critical information prevents teachers from implementing such new pedagogical ideas, even simple ones due to the time costs if the targeted space is not available and the whole class must return to the classroom. Moreover, not all teachers have the time and resources to develop new ideas and surely are not aware of all the available possibilities. Unfortunately, we find the current facility (or classroom) management systems not suitable for use in this dynamic environment. The systems for commercial or non-commercial organisations seem to be developed mainly for standard administrative needs. Instead of traditional facility management features, teachers need a tool that supports them in organising flexible pedagogical activities and sharing pedagogical practices. To successfully develop a learning space management system, we need to carefully examine the objectives that teachers asso-

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ciate with the open and adaptable environment.

As a result, the requirements for a learning space management system were produced in the ONSPACE research project between May 1 and December 5, 2014, before the building construction even started. Requirements elicitation is one of the most critical activities of software development and is known to be a major reason for project failures (Pacheco and Garcia, 2012). We grounded our research in two assumptions: First, to get a better understanding of teachers' work, we needed to involve our stakeholders and arrange user-centred workshops based on participatory design principles. Participatory design emphasises shared decision-making, which is crucial when different stakeholders are involved (Frauenberger et al., 2015). Second, traditional requirements elicitation concentrates on identifying system's goals, functionality, and limitations (Pacheco and Garcia, 2012). While this is fundamental, we argue that the stakeholders' objectives need to be defined more holistically than just considering the actual system. Therefore, we applied a method developed by Professor Ralph Keeney and proposed in the book *Value-focused Thinking: A Path to Creative Decision Making* (1992). The method offers systematic guidelines, which are described in a later section, for identifying objectives for the defined decision problem.

This study has both methodological and practical contributions. Value-focused thinking has been applied in multiple domains, but less in the context of requirements elicitation, especially as they relate to education. Learning space management systems are currently gaining attention as modern schools increasingly adjust to the idea of open and adaptable learning environments (Sanoff and Walden, 2012). The identified objectives were used during implementation of the learning space management prototype. To fulfil our goals, we framed the following research questions:

- How can value-focused thinking be implemented and applied to the requirements elicitation context?
- What are the objectives associated with an open and adaptable environment?

For the first question, we describe in detail how we applied the method, and for the second, we interpret recordings from the workshops and present the identified objectives. The original requirements specification document is in Finnish and consists of 32 pages; therefore, its full inclusion is beyond the scope of this paper. Instead, we highlight and discuss the process of extracting the objectives, followed by a discussion of the objectives. The prototype of the system was developed in 2015, in the sequel project called ONSPACE2, and the objectives were used as guiding evaluation principles by software engineers during development of the learning space management system.

2 APPROACHES FOR USER PARTICIPATION AND INVOLVEMENT

User participation and involvement are considered essential for success in system development (Barki and Hartwick, 1994; He and King, 2008; Mahmood et al., 2000), as they improve the quality of the system by generating more precise requirements (Harris and Weistroffer, 2009) and tend to lead to a positive attitude and perceived usefulness among users (Abelein and Paech, 2015; McGill and Klobas, 2008). Participation refers to assignments, activities and behaviours that users engage in during the system development process and involvement is a psychological state of the individual, defined as the importance and relevance of a system to a user (Barki and Hartwick, 1994). User involvement can also be seen as a broader concept, in which users are somehow involved in the system's development process, whereas user participation refers to more active and intentional involvement (Iivari et al., 2010).

Kujala (2003) has presented methodological approaches to achieving participation and involvement (Table 1). In user-centred design, ethnology, and contextual design, participation can be characterised as an approach by the designer to gain information from participants. The fundamental difference in participatory design is that it encourages participants to actively take part in the decision making and creative processing of the solution (Frauenberger et al., 2015). The goal of participatory design is not just to empirically understand the design activity (or users, as in user-centred design), but to simultaneously envision, shape, and transcend it to benefit the participants (Spinuzzi, 2005).

The ideological grounding of participatory design emerged from Scandinavian workplace democracy to ensure that people who are affected by technology can also participate in making decisions about it (Bjerknes and Bratteteig, 1995; Ehn, 1988; Halskov and Hansen, 2015; Muller and Kuhn, 1993). In participatory design, the following statements are understood as guiding principles: participants from diverse backgrounds are seen as experts in how they live their lives and design in collaboration with other profes-

Table 1: Methodological approaches to achieve participation and involvement (Kujala, 2003).

Participatory design	User-centered design	Ethnography	Contextual design
Democratic participation	Usability	Social aspects of work	Context of work
Workshops, prototyping	Task analysis, prototyping, usability evaluations	Observation, video analysis	Contextual inquiry, prototyping

sionals (Sanders et al., 2010; Sanoff, 2007), participants have the right to influence technological decisions affecting their private and professional lives (Bergvall-Kåreborn and Ståhlbrost, 2008), and especially, participatory design is seen as appropriate in the context of special needs (Benton et al., 2014; Frauenberger et al., 2011; Guha et al., 2008; Malinverni et al., 2014). Thus, we have based our workshops on participatory design to adopt these principles and we have implemented value-focused thinking as a requirements elicitation technique.

3 VALUE-FOCUSED THINKING

Value-focused thinking (VFT) comes from the operational research field and has been applied to decision problems in multiple domains, such as defence, environment, energy, government, corporations, and intelligence (Parnell et al., 2013). The underlying principle of VFT is that when faced with a decision problem, participants should first examine their values. In general, values are core concepts within individuals and society (Williams, 1979). Values are desirable and trans-situational goals that serve as principles that guide one's lives (Friedman, 1996; Schwartz, 1992). Keeney (1992; 1996) employs values as principles for evaluation of actual or potential consequences of action or inaction, of proposed alternatives, and of made decisions. In VFT, decision makers reflect what they want to achieve instead of immediately comparing alternative solutions. Values are made explicit for examination by associating them with a specific statement of objectives, which are in the form of a verb followed by an objective (Keeney, 1992; Keeney, 2013).

The basic steps of the VFT process are as follows: develop a list of values, convert values to objectives, and classify them as a means-ends objective network (Sheng et al., 2005; Sheng et al., 2010). The starting point is the statement of the problem to be solved. The definition of the problem must be made carefully to ensure a shared understanding of the situation. Participants are asked to make a list of anything that he or she hopes to achieve by solving the problem being addressed. This is done without any restrictions or constraints in reflection, to reach the different dimensions that participants find valuable. After generating the initial list, participants are encouraged to extend the list using different mind-probing techniques (Table 3 in Keeney, 1996) . For example, participants can be asked to review each item and articulate why they care about it, which in turn might lead to new items. This phase of producing a comprehensive list requires intensive thinking and discussion, and it will most likely take several iterations.

The list is considered as completed when participants cannot find any new information about the problem. Then, each list item is translated into the format of objectives (Keeney defines this phase as converting values into a common form). For example, if the participants expressed that the school day is too busy, the item might be 'rush', and the objective would be 'reduce rush'. This might raise discussion, why there is the rush and how it could be reduced. This, in turn, may lead to new items and objectives. Finally, the list should be examined for possible redundancies.

The next phase is to structure objectives as fundamental and means objectives. Fundamental objectives characterise the essential interests in the decision situation representing the goals that participants value. Means objectives are of interest due to their implications for the degree to which fundamental objectives can be achieved. For example, if reducing rush is a fundamental objective, means objectives could be about having needed accessories available. Finally, the structure of these objectives is illustrated by building a means-ends network demonstrating how the different objectives are related to each other. The process of structuring objectives results in a deeper and more accurate understanding of what one cares about and helps to clarify the decision context and enhances the quality of decisions.

4 METHODOLOGY

This section presents the stakeholder organisation, describes the data gathering process and explains how data was analysed.

4.1 Stakeholder Description

The Valteri School Onerva is one of the six learning and consulting centres of Valteri schools that operate under the Finnish National Board of Education. The school provides services that support learning and school attendance in order to implement general, intensified, and special support. In the school, education is combined with rehabilitation and guidance that support learning to form a seamless whole. The school has expertise particularly in supporting needs relating to vision, hearing, language, and interaction. The school's mission is to increase the accessibility of support services and promote the neighbourhood school principle. The school aims to realise this, by making their operations more effective, creating new action models and innovations, and utilising new technology. The aim is to develop solutions for learning and rehabilitation that support learning for individuals. The school's activities are guided by a development-oriented approach and the utilisation of research and networking.

4.2 Data Gathering

We organised four workshops (Table 2) with the school's staff. The data was collected by recording the workshops with a video camera or mobile phone; the researchers also took notes. The participants were special education teachers, occupational therapists, visual sense specialists, and researchers. The researchers who participated in the workshops were all from the University of Jyväskylä, Faculty of Information Technology. There was some variation between workshops: in the first workshop there was one person from the technical staff, and in the last workshop there were two members of the instructional staff, but otherwise, the membership stayed constant. All of the workshops were held in the old school's facilities to help researchers understand the context at the given time and provide teachers and staff members with familiar surroundings.

The first workshop acquainted the participants with one another and familiarised everyone with the context of our study. Ininformal group discussions were conducted, during which we asked questions about the new school building, elicited their ideas of an open and adaptable environment, and discussed the initial need for the learning space management system. The technical staff member presented a three-dimensional (3D) model of the new school building, and researchers analysed it together with the participants. The researchers produced conceptual maps of the building to gain a better understanding of the new environment. Finally, the participants discussed the initial desired functions and the possible users of the system.

Table 2: Workshops in the study.

1.	14.5.2014	8 teachers, 1 technical staff, 3 researchers	Video
2.	24.8.2014	6 teachers, 4 researchers	Video
3.	27.9.2014	6 teachers, 3 researchers	Audio
4.	12.12.2014	6 teachers, 2 instructors, 3 researchers	Video

In the second workshop, the participants were asked to provide ideas that they associate as important with the open and adaptable environment. The intensive discussion resulted in a list of words which described anything that the participants perceived as valuable in the school context. The list was reviewed and discussed, and the participants defined higher level categories for each item. Finally, the participants transformed the items into objectives representing their shared understanding of how the item could be achieved. The objectives were examined together to remove redundancy and disentangle abstract objectives into more concrete ones. The emerging objectives were scrutinised by asking the participants 'why this item is important'. The goal of this back-and-forth process was to encourage more elaboration of the objectives. Because limited time was available during the workshop, the participants finished the task by themselves, and they sent the final document by email to the researchers.

4.3 Producing Functional Requirements

The analysis of the first two workshops was based on VFT methodology. First, the recordings were checked to ensure that there was no missing data and to support the researchers' notes taken during the discussion. The document then included a full list of objectives. When analysing the objectives, we found that some of them were directly related to the actual system and others related to the whole organisation. Therefore, the objectives were divided into two categories: system objectives and organisational objectives. From the system objectives, we derived the initial functions of the system and illustrated them as a use case diagram. Every use case was then described in use case scenarios, which detailed how the user interacts with the system.

In the third workshop, the researchers described to participants how the use case diagram was constructed and how the system would be used by describing the use case scenarios. Furthermore, the researchers presented initial user profiles, system architecture, and non-functional requirements. The participants then discussed the requirements and gave feedback on how they could be enhanced. After the workshop, the requirements were updated using the feedback from the participants. The final version of the document was sent to the participants two weeks before the final meeting, in December 2014. In the last meeting, participants evaluated the outcomes and validated the produced requirements. The participants appreciated the transparency of the design process and how researchers were able to communicate using language they understood. Finally, researchers thanked the participants for their collaboration and discussed future plans for the prototype development.

4.4 Identifying Objectives

The recordings of the four workshops were transcribed in order to gain an overall view of data, which were then exported into the ATLAS-ti software for more detailed interpretation. Data was analysed through a process of open coding (Corbin and Strauss, 1990) to develop a list of quotations that related to the objectives of the group, that is, what the group considered important or how the desired situation could be achieved. All 153 quotations were examined one by one and assigned at least one code. The coding process was overlapping: a single quotation could be connected to many different codes and vice versa. If it was impossible to connect a quotation with any of the previous codes or imagine a new code, the quotation was removed as an irrelevant phrase. Finally, 133 quotations remained that had been assigned at least one code. The rejected quotations were examined to ensure that no relevant data was removed.

The quotations inside the codes were refined to ascertain that the codes had a coherent structure. The codes, including the assigned quotations, were analysed to differentiate between fundamental objectives and means objectives. If the assigned quotation expressed an essential objective, it became a candidate for a fundamental objective. If the assigned quotation expressed something that was important because of its implications for some other objective, it was a candidate for a means objective. Finally, the transcriptions were read through again to validate the structure of the objectives.

5 THE IDENTIFIED OBJECTIVES

The fundamental objectives regarding an open and adaptable environment were improving communication, increasing efficiency, enabling functionality, taking special needs into account, ensuring privacy, and strengthening the community. These are further discussed one by one. System level means were defined as those features of the system that could possibly contribute to an associated fundamental objective. Organisational level means represent the social actions that contribute towards the fundamental objective.

5.1 Improve Communication

Table 3: Improve communication.

Communication culture
Discuss conflicting reservations
Access with mobile devices
Automatic conflict handling
Information about reserved spaces
Purpose for reservations
Information about the owner of a reservation

The first fundamental objective was improved communication. The hope was that teachers, staff, and students would not be isolated in the classrooms and this would encourage more communication between people. We thus interpreted communication as a central objective, even though it often appeared implicitly in the data, because it is strongly connected to other objectives. For example, the connection with privacy appears as a need to have spaces available for private conversations between teachers, students, and other stakeholders. Participants emphasised that, regardless of the features or possibilities of the system, there is a need for a culture of open communication. It is unavoidable that conflicts will occur when adjusting to a new environment. Participants agreed that the responsibility for solving conflicts cannot be outsourced entirely to technology. Even when a mechanism for automatically resolving reservation-related conflict would exist, the prioritisations policy must be determined by the people.

Communication can be improved in many ways at the system level. The primary feature required was that the system could be accessed by mobile devices. The participants stressed that they do not have time to look for a desktop computer during the day.

One proposition was that there could be tablet devices ported near the learning spaces, making it easy to check the status of the space and make a reservation. The participants brought up the issue that information related to reservations needed to be easily accessed and needed to contain some mandatory fields: contact information of the person who made the reservation and the purpose of the reservation. From a pedagogical perspective, there should also be features allowing for commenting, rating and sharing knowledge about the learning possibilities of spaces.

5.2 Strengthen Community

Table 4: Strengthen community.

Responsible use of shared resources
Negotiated rules and norms
Open discussion
A “right of way” feature Reservation status

Strong community was conceptualised as a situation wherein the whole school community, among stakeholders, is able to negotiate shared goals and work together towards them. As discussed before, the participants emphasised the need for a culture of open communication. The participants concluded that they needed to learn ways to co-operate in an open and adaptable environment: the actions are less confined to classrooms, and possible conflicting encounters need to be negotiated. It is not just the policies and rules that need to be negotiated with the school staff, the whole operational culture of the school needs shifting.

The participants proposed an interesting feature for the system, which was named ’right of way’. The idea was that the system could understand if someone had privileges to certain spaces and automatically reorganise the reservations based on these privileges. This raised an intense discussion about what constituted privileges and whether this idea conflicted with the open and adaptable environment. Moreover, this feature would be rather complicated to implement technically.

An essential method of strengthening the community was found to be the possibility of marking reservations with open or closed status. An open reservation means that the space is reserved for certain people, but others are still welcome to use it at the same time. Some spaces are divided into smaller rooms or areas, which could be used in parallel. For example, two classes of deaf children, communicating via sign language, could share the same room as long as they would use the separating curtains available in the room. This feature was appreciated by the participants because it further supported the idea of collaboration and more efficient use of facilities.

5.3 Increase efficiency

Table 5: Increase efficiency.

Planned behaviour
Visual information
Real-time information
High usability
Mobile use

The participants extensively discussed how everyday life would be organised in the new environment. The idea of not having their own classrooms was both fascinating and frightening. The main expectation from the technological tool was that it would help to organise the school activities. This is a crucial issue and affects the whole work community, as one teacher commented: ’I think, it [the system] would help to sort things out, without unnecessary hassle. It is something that would have a great impact on our work atmosphere’. We interpret that time is the most limited resource the participants have, and it is extremely important that using the developed technology does not waste it. The participants also emphasised how the ability to plan activities beforehand will make the working day more tranquil.

When considering the actual system, the participants described that efficiency was about getting real-time information that could be used everywhere and that was easy to use. They also noted the possibility of having visual information. A concrete example of the relationship between ease of use and efficiency being discussed was based on their previous experiences with a facility management system which had a complicated function for removing reservations and resulted in too many ‘no-show’ reservations. A visual view (visual interface) of the building was important for the participants. They were used to perceiving the dimensions of the new building on the map. The possibility of making reservations with a visual picture was thought to be more accessible than, for example, a list of available spaces. Mobile access was again mentioned, because it supported the idea of an open and adaptable environment, by encouraging people to move around.

5.4 Enable Functionality

Table 6: Enable functionality.

Think differently
Functional pedagogy
Creative use of new learning spaces
Recommends suitable spaces
Shows accessories
Shows the purpose of space
Shows size of the space
Accessible from different locations
Accessible with different devices

The participants shared the view that action-based learning has a very important role in special education; therefore, enabling functionality is one of the main goals of the open and adaptive environment, and so, it seems rather self-evident for a functional objective. Functionality was conceptualised as a vision where activities are always happening in the space that is most suitable for the intended pedagogical practice and that is available at the current moment. The participants hoped that a more functional environment would lead to more creative pedagogy because of the possibilities the new learning spaces are offering. However, creativity was seen as a challenge: how to question the old practices (and think differently) and pedagogically combine the needs of the students and new learning spaces?

The main question at a system level was what spaces are made available for reservation. There seemed to be contradictory views between the new way of understanding all spaces as 'open learning spaces' and the need for individual and private spaces for certain tasks. This discussion resulted in interesting observations, for instance: if there is a room with several workstations, does the reservation apply to the whole room or is it possible to reserve only a single workstation? Solving these issues leads to a clearer understanding of the level on which the decisions are made: between people, pre-programmed in technological systems, or as institutional policies. According to the participants, the following features of the system would enable functionality: the system is able to recommend the most suitable spaces based on certain criteria, it is easy to see important information in the system, and the system can be accessed from any location in the school with most used devices.

5.5 Pedagogical Use

Table 7: Pedagogical use.

Empower students
Guide to responsible use of ICT
Proper authentication policy
Generic student accounts
Take account of special needs
Accessible user interface

The students of the school have a wide range of special needs. Different perceptional abilities present a challenge between the creative and dynamic use of learning spaces and the need for structure and formality. For example, it is essential for blind students to learn how to navigate through the building and find the necessary accessories inside the learning spaces on their own. The school introduced several guides for this, including typical tracks for blind people, but also innovative uniquely textured walls, which helped identify the respective spaces, as well as a novel sound-based guidance system (specific intersections emitting different little tunes, to be uniquely identifiable).

The participants, however, discussed that the world itself is not structured for the needs of blind people, and an important aim is to teach students to act independently outside the school. This reflects the idea that using the system should be one way to facilitate the students' independence. The system was seen as an opportunity to enhance responsibility by empowering students to reserve learning spaces for themselves and by guiding students towards responsible use of information and communication technology (ICT). The participants noted that permitting students to use the system could result in accidental or intentional misuse, but they seemed to agree that, despite the possible unwanted scenarios, it is important to accustom students to ICT.

An important issue was to deciding on user policies and authentication within the system. One possibility was to create user accounts for every student, but this would raise challenges related to security and technical implementation. Information related to students has high-security classification, which would mean tight restrictions in the system. The participants proposed the possibility of making generic user accounts for students, so their personal information could not be revealed. Special needs should be taken into account in system development to make pedagogical use of the system possible.

5.6 Ensure Privacy and Security

Table 8: Ensure privacy and security.

Respect private spaces
Critical information in dedicated server

An important matter of discussion was how privacy could be ensured in the open and adaptable environment. The participants emphasised the need for private spaces to have conversations with stakeholders and how this privacy needs to be respected. They also commented that visual positioning information about staff or students could be very useful, but that it raises many privacy-related problems. However, participants explained that they have actually had emergency situations during which a student has been completely lost.

From a technical perspective, the discussion focused around how the current technological infrastructure is connected to the system and what security vulnerabilities it might cause. The participants concluded that critical student information is stored in dedicated servers and that access to the system should be restricted.

6 DISCUSSION AND CONCLUSION

This paper briefly presents the process and the results of our requirements analysis for a rather typical information management system, but for a completely new environment, represented by the open and adaptable school. It was clear from the beginning that we needed to re-imagine the characteristics of facility management systems as they seemed to be developed primarily for administrative purposes. In practice, we needed to encourage the participants reflect on the new surroundings and their everyday work to frame what was important to them and to clarify what they wanted to achieve. To reach this goal, we organised four workshops, during which we applied value-focused thinking to identify objectives for developing a learning space management system for an open and adaptable environment. Our analysis had two stages: first, we needed to analyse the workshops from the perspective of requirements specification in order to establish necessary attributes of the system, that is, functions, a use case diagram, and use case scenarios. After the workshops, we made a more in-depth investigation of the data using an open coding analysis. This two-staged analysis was used to verify our analysis. As Morse et al. (2002) have presented, data may demand to be treated in different ways, so the analytic procedure should match the research questions. The first analysis stage was more practical and straightforward while the second stage required more reflective strategy and critical discussions about the project between the authors of this paper.

The identified fundamental objectives regarding the open and adaptable environment included following: improving communication, strengthening community, increasing efficiency, enabling functionality, pedagogical use of the system, and ensuring privacy and security. These fundamental objectives, as well as the means to achieve them, are described from the system and organisational level. We argue that this will help other researchers and implementers to take a more holistic view in the development phase: the functions and features of the system need to be considered together with organisational level means, and they should be in line with approved fundamental objectives. The results give more in-depth representation about the context, people, and environment for which the system is developed.

We implemented the principles of participatory design in our project. The participants had a real opportunity to influence what kind of system will be developed, and there was strong collaboration between researchers and participants. Researchers were able to learn about the work and the new environment of the participants and the researchers were able to share knowledge about technical possibilities as well as restrictions. We also collided with issues when considering our project as participatory design. VFT does not put emphasis on the complex power relationships participants may have. The method assumes that people are able to communicate their thoughts, regardless of the social hierarchies that may constrain the discussion. Furthermore, VFT examines the identified objectives as a whole, while the objectives between different stakeholders might be very conflicting. The question is, whose objectives are we supposed to meet? Claiming that the project is based purely on 'participatory design' may even be considered somewhat unjustified, due to the fact that the actual analysis (objective identification) was made by the researchers. Even when we were concentrating on the objectives of participants, the role of the participants was more that of informants than actors.

The philosophy behind VFT is that the identified objectives are based on the values of decision makers rather than just comparing possible alternatives. The concept of value is very challenging, because of the different definitions of value in different research fields and even among individuals. Keeney's (1992; 1996) definition is very general, and the dif-

ference between the concepts of value and objective is not completely clarified. To underline the point, for some people, value is about currency or efficiency and for others it is about ethical questions. As an anecdote, Cockton (2004; 2006) changed the name of the concept from value to worth after struggling with the same issue. It may seem appealing to use a pre-defined set of values, as in Schwartz's (2012) theory of basic values, which provides more depth to the contents and structure of values, but as Isomursu et al. (2011) discussed, using a pre-defined framework to analyse and interpret the findings can lead to confirmation bias.

Even if we embrace Keeney's definition, the question arises of how to reach abstract constructions that may be difficult to form as statements. For example, Iversen et al. (2012) pointed out that values are not static entities that are waiting for researchers and developers to collect them, but more like changing, complex and abstract ways of being and thinking. Keeney seems to take it for granted that decision makers are automatically people who are able to express what is important to them. For example, when designing with children, there should be more appropriate methods than just asking 'what it is that one cares for'. People's values tend to emerge, change, and conflict, and researchers should carefully consider who is answering these questions and what they mean.

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