

Interaction Design Qualities: Theory and Practice

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ABSTRACT

This paper reports the results of an action research project investigating the articulation of interaction design qualities for a web portal for urban planning and development. A framework for analyzing interaction design qualities is presented. The framework consists of the practical, the social, the aesthetic, the structural and the ethical quality dimensions, and it was tried out in practice with developers and designers of the portal. This provided experiences used to revise the framework. The results indicate that the framework can be improved by splitting the social quality dimension into a communicational dimension and an organizational dimension. The structural dimension is also renamed to the technical dimension.

Author Keywords

Quality in use, User experience, Use qualities, Experiential qualities, Interaction Design Qualities.

ACM Classification Keywords

H5.2. Information interfaces and presentation (e.g., HCI): User Interfaces – Evaluation/methodology, theory and methods.

INTRODUCTION

Design involves assessing alternative solutions, and also presenting an argument for a solution in comparison to other solutions. That is, giving the rationale for the design [6, 20]. To give a design rationale it is necessary to articulate what the criteria for assessment are. These criteria may be articulated in terms of “what individuals and groups consider to be worthwhile” [7, p. 172], as hierarchically ordered design objectives [16], or as usability attributes and goals [23]. They may also be expressed as *interaction design qualities* (also called use qualities or experiential qualities), which denotes the experienced attributes of artifacts-in-use [1, 2, 13, 14, 19]. It includes both subjective

user experiences, as well as practical, social or even societal consequences of an artifact-in-use. Desirable and articulated qualities can be utilized for assessment of an artifact-in-use based on values people have regarding how it should be experienced. The desirable qualities are instrumental to the values that motivate the design.

Much like functional requirements, the articulation of desirable qualities starts with the design brief and can be challenged by bottom-up field research with users and clients, much in the same way as Whiteside, Bennet and Holtzblatt early on envisioned how to work with contextual usability [23]. Methods like repertory grid may also be used to extract user experience dimensions [12].

The framework for interaction design qualities used in this paper has a background in Ehn and Löwgren’s notion of quality-in-use [10]. They borrowed their framework from the ancient Roman architect Vitruvius. The framework used here also builds on Dahlbom and Mathiassen’s ideas on IT-artifact quality [8], which in turn build on the Swedish functionalist design movement [21].

Based on these earlier frameworks, this study makes use of the following design quality dimensions: practical, social, aesthetic, structural, and ethical. This framework has also been outlined in earlier research [1, 2, 15]. Borrowing concepts from activity theory [4, 5, 11, 17, 18, 22] we characterize the design quality dimensions in the following manner:

- *The practical dimension.* The artifact as a tool for mediating instrumental action and attention directed at a material object. The tool itself remains in the background of attention.
- *The social dimension.* The artifact as a sign or medium, mediating social or communicative action and attention directed at other people. The sign itself remains in the background of attention.
- *The aesthetic dimension.* The artifact as an objectified form, mediating action and attention directed at the user’s own experience of the artifact.
- *The structural dimension.* The artifact as an objectified structure, mediating action and attention directed at the construction or material of the artifact.
- *The ethical dimension.* The artifact as objectified concept, mediating action and attention directed at ethical concerns.

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For a design to be really thought through as whole and in its details, all of these dimensions need to be considered [1, 2, 15]. It is, however, possible that there are some dimensions that are more important for some artifacts in some situations, while other dimensions are less important.

AIM

This study has an aim typical to action research [3, p. 95]: “try out a theory with practitioners in real situations, gain feedback from this experience, modify the theory as a result of this feedback”. The theoretical construct tried out in this study is the framework for interaction design qualities, and the practitioners are developers and designers of a web portal for urban planning and development.

METHOD

The study is a participatory action research project [24], with a focus on co-learning between the researchers and the practitioners, by jointly searching for problems, interpretations, courses of action, and meaningful concepts.

Project Outline

In 2006, the Swedish National Board of Housing, Building and Planning initiated the Planning Portal project. It aimed at developing a web portal where people working with urban planning and development would be able to get as much information they needed as possible, particularly geographical information. This study focuses on Work package 1: User Needs Analysis. An iterative systems development model was used, where requirements were revised after testing in all iterations.

In the end, three online services were developed for the portal: the Search Service where you search for and can view data sets; the Wind Service, which provided support for localization of wind power plants; and finally the Overview Planning Service, which provided support for overview planning at municipalities. The design solutions in themselves and their specific qualities will not be analyzed in this short paper, the interest for this paper is instead an analysis of the interaction design qualities articulated in the documentation of the project in relation to the quality dimensions described in the introduction.

Data Analysis

The analysis focused on the documentation from the first two iterations of prototyping in the project. The data for this analysis was gathered from a number of sources: original and revised project plans; hierarchies of design objectives generated in the project; interview protocols from user research, questionnaires created to be sent to users; field notes from user research; field notes from project meetings; written inspections; inspection protocols, comments from users; and e-mail communication in the project. Data was analyzed using qualitative content analysis [9]. The articulated interaction design qualities were summarized and sent out to project members for feedback on the interpretations made by the researcher. There were 205

articulated statements about how the portal was or should be experienced. The researcher then condensed them to one or a few words, and these condensed meaning units were put into a table and categorized using the five design quality dimensions. The result of the analysis was presented to the project team and the project management for discussion.

RESULTS

46 of the categorized statements primarily had structural aspects; 98 primarily had practical aspects; 35 primarily had social aspects; 10 primarily had ethical aspects; and 16 primarily had aesthetic aspects.

Structural aspects included technical issues of the quality of data and metadata, its structure, integration of systems, conformity to standards, data security, authorization functions, performance, and integration of data formats. It also included the structure of business models for the portal. The structural aspects were found in the original and revised project plans, and in comments from the construction team during the inspection. Users highlighted some practical consequences of structural issues.

Practical aspects were expressed throughout the two first iterations. About half of the articulated qualities concerned practical aspects. It included the portal as a support for planners, and as a means to get information. Effectiveness and efficiency were important qualities. Making things easy and available for people, simplifying, facilitating contacts, providing useful content, and understandable user interfaces were all articulated qualities that largely concerned practical issues. These design qualities were central in the original and revised project plan, and they dominated comments from users, as well as inspections.

Social aspects concerned the coordinative and communicative functions of the portal including the facilitation of contacts with authorities, facilitation of a good dialogue between stakeholders, information dissemination, and co-ordination of case handling among authorities. Organizational issues, such as who should have authority to access certain data sets had strong social aspects. Another social aspect concerned trust in that the data was correct, and this may depend on the person or organization behind the data. Promoting methods in urban planning was considered a social task, as well as a practical. All of these issues were articulated in the project plans and user studies. The importance of a professional identity and branding for the portal was, however, not highlighted. That part of the social aspects was only present in the researcher's analysis during the inspection.

Ethical aspects were evident in the original and revised project plans, especially regarding sustainable welfare development, citizen consultation, equal conditions, and making the right decision. Other ethical issues were considered during several meetings, but were not put down in any project documentation. Such issues included the privacy of the citizen in data sets. There were also data sets

that needed authorized access, and requirements were written based on such considerations. In the early meetings there was also a discussion of how much the portal should support citizens who wanted to know more about a particular plan and what their abilities to influence it were. An example would be the localization of a wind power plant, and how it would affect the view from one's house. In that particular case, it was decided that the design should not particularly be aimed toward the everyday user. The ethical aspects have, however, been absent in data from users, and they did not appear in the inspections.

Aesthetic aspects were completely absent in the project plans. The user study focused on practical issues like simplicity, focused content, ease of use of user interfaces, and overview. These primarily practical concerns also have aesthetic dimensions. Simplicity is, for example, connected to aesthetics, and it gives rise to user experiences like ease or overview. To the users, the portal gave the impression of being a "very technical product" with low degree of "user friendliness" and it also used a difficult language. In the researcher's analysis during the inspection, issues concerning the lack of flow, simplicity, restfulness and professional look and feel were highlighted.

Reflections

The analysis was presented to the project management and project team, and it was used to highlight areas of importance. The analysis was a tool for reflection on aspects that had been emphasized and aspects that had been neglected. Looking back on the project there was agreement that people in project had focused too much on the technology and not taken a sufficient user perspective. More and tighter user participation could have provided more emphasis on the user experience. The project managers thought it would have been good to spend more time early in the project to discuss the objectives, and also return to this discussion several times during the project. Having users participating in these discussions was also considered to be good practice.

DISCUSSION

The aim of this study has been to try out the framework for interaction design qualities with practitioners in a real situation, getting feedback from this experience, and modifying the framework as a result of the feedback.

The reflections indicated that the analysis of articulated design qualities highlighted areas of importance, and project members perceived it as a tool for reflection.

The analysis also provided insights on how to modify the framework. Communicative issues like facilitating networking, were categorized as social. The reason was that it concerned usage of the artifact directed towards other people rather than towards a material object. Business models were treated as structural since they concerned the structure and organization of a business.

All articulations that were difficult to categorize were related to the organizational, communicative and business issues. The social dimension became too wide when we included all these issues in that dimension. It also got several sub-dimensions, which made it difficult to use in the analysis. This is also an area where all the frameworks covered in the introduction of this paper may be too crude, due to their heritage in relatively simple industrial products or crafts products. Interactive information technology is a complex social communication medium in all essentials. Issues of organizational change and communicative aspects are hence inescapable in interaction design.

The framework for interaction design qualities used in this study was built on the basic triangle of mediated activity, which consists of subject, artifact, and object. All issues difficult to categorize fall within the domain of Engeström's [11] extension of this basic triangle where he included a community of people, a division of labor and cultural rules. A development of the framework needs to take the extended triangle of mediated activity into account. Kuutti [18] points in the same direction in his framework where he separates between the functional, the meaningful, and the economical. In our framework, this can be achieved by splitting the social into a communicational dimension and an organizational dimension:

- *The communicational dimension.* The artifact as a sign or medium, mediating social or communicative action and attention directed at other people. This includes both direct mediation of a message, and the more indirect symbolism of what the artifact means to us and signals to others. The artifact itself remains in the background of attention.
- *The organizational dimension.* The artifact as a business component mediating social or societal action directed at a community of people and its division of labor and its rules. The community of people that action is directed at can be either internal or external to the organization. This dimension includes issues like organizational change and business models.

Since business models in this development are thought of as belonging to an organizational dimension, the structural dimension may be renamed to *the technical dimension*.

In this study, the quality dimensions were used to categorize statements the future artifact. As indicated by Ehn and Löwgren [10] it may be more fruitful to analyze every statement in terms of all the dimensions. Every quality is then seen as multi-dimensional. This means highlighting, for example, the organizational aspects, the ethical aspects, and the practical aspects of a business model. The dimensions would then be used as sensitizing concepts rather than categories.

Conclusions

The framework for interaction design qualities may facilitate a clarified view of criteria, if they are articulated

in close cooperation with users. The framework can also be improved by splitting the social dimension into the communicational and the organizational. The structural dimension is also renamed to the technical dimension. This gives the following set of design quality dimensions:

- Technical design quality
- Practical design quality
- Communicational design quality
- Organizational design quality
- Aesthetic design quality
- Ethical design quality

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