Interaction Designers' Conceptions of Design Quality for Interactive Artifacts

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Abstract

It is important to be aware of different ways of seeing design quality of interactive artifacts in order to appreciate the various aspects of a design, but how do professional interaction designers understand design quality? In theory, one way of approaching design quality of interactive artifacts has been the Vitruvian principles of commodity, firmness and delight, originally created for architecture. Such frameworks are, however, seldom directly employed in practice. This paper investigates what conceptions professional interaction designers have of design quality for interactive artifacts. Interviews were conducted with ten designers. The analysis disclosed four conceptions concerning: (a) Constraints & contexts, (b) motivations & purposes, (c) use-qualities of functions & content, and (d) experiential qualities of form & behaviour. An awareness of these conceptions may facilitate the appreciation for different aspects and opportunities in a design situation.

Keywords

interaction design; design quality; use-qualities; conceptions, user experience.

Interaction design has many fields of origin that potentially have different design ideals. This means that there is a complexity in the criteria and values that shape an interactive artifact. So what do professional interaction designers really mean when they say that an interactive artifact is an example of good or bad design? It is likely that different designers have quite different conceptions of what good design really is? It is important for researchers, students, professional designers, critics and managers in interaction design to be aware of different ways of seeing design quality of interactive artifacts in order to appreciate the various aspects of a design. Alternative perspectives can open up for reflection, learning, and change, but the lack of such awareness may obscure design opportunities (Hult, Irestig & Lundberg, 2006). The conception of design quality among interaction designers is the problem area of this paper, but first a few words on the notion of interaction design.

In their design effort, interaction designers focus on interaction with artifacts and experiences of interactive artifacts. Bill Moggridge and Bill Verplank coined the term interaction design in the late 1980s to describe their work at the intersection of industrial design, information design, graphics, human factors, and computer science. Moggridge (2007) pictured a creative and imaginative design discipline working with software, designing behaviours, animations, sounds, and shapes. Like industrial design the new design discipline would focus on qualitative values. It would start with the needs and desires of people who would use a product or service, and aim towards designs that would give aesthetic pleasure, lasting satisfaction and enjoyment. Verplank summarizes his view on the interaction designer's job by answering the three questions; how you "do", "feel" and "know" (Moggridge, 2007). Interaction design does, however, not only involve shaping conditions for the interaction between people and artifacts. It also involves shaping conditions for the interaction between people by means of artifacts (Arvola, 2005; Buchanan, 2001; Hernwall & Arvola, 2008). This points towards understanding interaction as conversation, which is a more complex process than the feedback loop used in Verplank's do, feel, and know questions (Dubberly, Pangaro, & Haque, 2009). The word interaction in human-computer interaction design, can be defined as a mutually and reciprocally performed action between several parties in close contact, where at least one party is human and at least one is computer-based (Arvola, 2005). This gives a background to interaction design, before returning to the issue of design quality in this field.

Design Quality

A multifaceted approach to design quality has been used in architecture since Antiquity, when Vitruvius described the virtues of a building in the terms utilitas, firmitas, and venustas. An often-used translation of those terms is commodity, firmness and delight. The same framework is still used today as in for example the Design Quality Indicator—DQI (Gann, Salter & Whyte, 2003)—where the three Vitruvian principles have been given a modern day interpretation in a conceptual framework consisting of three aspects: Function (use, access and space of a building), Build Quality (performance, engineering systems and construction), and Impact (form, materials, internal environment, urban and social integration, identity and character). DQI is pictured as a pyramid with sides representing function, build quality and impact. The form of a pyramid highlights the multifaceted nature of design quality. Gann et al. (2003) give the example of lighting in a building, which has a functional quality of providing a bright and accessible work area, but also has an impact on the pleasure and wellbeing in use of the building.

The Vitruvian principles have also been introduced in interaction design theory by Ehn and Löwgren (1997) who defined a framework for quality-in-use of interactive artifacts. Their interpretation of the Vitruvian includes structural aspects assessed from, a constructional quality perspective, functional aspects assessed from an ethical quality perspective, and formal aspects assessed from an aesthetic quality perspective.

Dahlbom and Mathiassen (1993) have introduced a similar framework for quality of IT-artifacts. Their work is built on the design movement of the Swedish functionalists during the first half of the 20th century (Paulsson & Paulsson, 1956). Their framework includes four quality aspects for evaluating technical artifacts: functionality, for evaluating practical use; aesthetics for evaluating looks and experiences; symbolism, for evaluating social use, what it means to us and signals to others; and politics for evaluating wider effects on peoples' lives, including power relations, coercions, and liberties supported and encouraged by the artifact. The political aspect is also closely related to ethical issues concerning what practices and behaviours are supported and required from users.

These theoretical frameworks for design quality have also been used in combination (Arvola, 2005, 2007; Johansson & Arvola, 2007), but they are still theory; the question here is instead how practicing interaction designers conceptualize design quality.

Conceptions

The units of analysis in this paper are conceptions of quality that interaction designers have. A 'conception' is a specific way "in which people understand a particular phenomenon or aspect of the world around them" (Marton & Pong, 2005, p. 335). Conceptions are represented by qualitatively different meanings or 'categories of description' of the phenomenon. A 'conception' has in earlier research also been called 'ways of conceptualizing', 'ways of experiencing', 'ways of understanding' 'ways of apprehending' and 'ways of seeing' (Marton & Pong, 2005). Conceptions are also structurally linked to each other in what is called an 'outcome space' that describes logical relations (often hierarchically inclusive) between different ways of seeing a phenomenon.

The aim of this study is to explore the range of different ways of conceptualizing design quality among professional interaction designers. The result will be an analysis of categories of description and a clarification of structural relationships between these categories.

When describing designers' ways of conceptualizing quality one can distinguish between structural and referential aspects of experience (Marton & Booth, 1997). Structural aspects refer to the discernment of the whole from the context and discernment of the parts and their relationships within the whole. Referential aspects of experience refer to identification of what something is; the assignment of meaning.

Another distinction, used in phenomenology, is between an external and an internal horizon of experience (Marton & Booth, 1997). The external horizon of experience is that which surrounds the phenomenon experienced including its contours. The internal horizon of experience is the parts and their relationships, together with the contours of the phenomenon.

The research question for this study is: What are the conceptions interaction designers have of design quality in relation to interactive artifacts? The theoretical framework for design quality and conceptions forms the background to the study. Next, the method for answering this research question is presented.

Method

Semi-structured interviews were conducted with ten professional interaction designers. Interviews were recorded and transcribed into a verbatim transcript, which was analyzed using qualitative content analysis.

Participants

Ten interaction designers (four female and six male), with four to thirteen years of work experience, participated in the study. Two participants were based in Finland and eight were based in Sweden. The designers in Sweden had an educational background in cognitive science and human-computer interaction with a profile in interaction design. One of the designers in Finland was originally from Spain, but had lived in Finland for eleven years. He had an educational background in business and new media with a design angle. The other designer in Finland described himself as a media artist and designer, and had an educational background in photography and installation art. The different areas that the participants worked in covered government websites, intranets, office applications, electronic medical record software, air traffic management software, concept design for future home communication, ambient media, interactive exhibitions, and mobile television applications. Participants worked as freelance designers, at small and medium-sized usability and design consultancies, and as in-house designers at software companies.

Data Collection

The interviews were semi-structured and ranged from 45 minutes to 1 hour 40 minutes. Five of the interviews were conducted face to face and five were conducted over distance via video calls. Three interviews were audio recorded and seven interviews were also video recorded. The two interviews conducted in Finland were made by one interviewer, and another interviewer made the interviews in Sweden. The interview guide was revised after the first two interviews. It focused on the participants' workplace, role, projects, background, views on design quality, and design processes. All taped material from the interviews was transcribed and partly normalized to a written form. Names of clients were removed from the transcripts.

Procedure of Analysis

The procedure of analysis in this study builds on Graneheim's and Lundman's (2004) review of the methodological literature on qualitative content analysis.

The interviews were read through and listened to several times to obtain a sense of the whole. Overarching content areas in the interview text was then identified. Sections concerning design quality were extracted and brought together into one text. The extracted text was divided into meaning units that subsequently were condensed. The condensed meaning units were abstracted and labelled with a code. The various codes were compared based on differences and similarities and sorted into 19 sub-categories and 7 categories, which constitute the manifest content. The tentative categories were discussed by a group of researchers and revised. What differed between the researchers were assessments about sub-categories, and the wording of specific codes and categories. Reflection and discussion resulted in agreement about how to order the codes. Finally, the underlying meaning, that is, the latent content, of the categories was formulated into themes.

The empirically driven qualitative content analysis was followed by a more theoretical analysis. The relations between categories of description were analyzed in more detail to map out the space of different ways of seeing design quality of interactive artifacts. The theoretical concepts of

referential aspects, structural aspects, internal horizon and external horizon were used in this analysis to clarify the structure of that space.

Results

Two overarching themes emerged in the analysis: Getting the right design and getting the design right. As a side note, the two themes also form the title of a paper on usability testing of alternative design solutions by Tohidi, Buxton, Baecker and Sellen (2006), as well as the subtitle of the book Sketching User Experiences by Buxton (2007). The different conceptions are presented in Table 1.

Theme	Conception of Design Quality of Interactive Artifacts as:
Getting the right design	A: Managing constraints on the interactive artifact
	B: Delivering a motivated interactive artifact
Getting the design right	C: Creating opportunities for usage of the interactive artifact and its contents and functions
	D: Creating opportunities for experiences of the interactive artifact and its form and behaviour

Table 1 Conceptions of design quality of interactive artifacts grouped around the two themes The right design and The design right

Conceptions A and B concerns getting the right design in relation to constraints and motivations, while conceptions C and D concerns getting the design of functions, content, form and behavior right. Getting the right design answers the question of why a design should be developed. Getting the design right answers how the design should be composed.

Conception A: Design Quality as Managing Constraints on the Interactive Artifact

Design quality can be seen as adapting to the conditions of a design project. An example is provided below:

I sometimes feel that you may have focused a bit more on this like ideal design on what you would have wanted to do if all preconditions where there, like time and opportunities, and no, for example, particular tool is chosen and so on. Such fixed parameters, you just have to take them into account because they're not gonna change during the project you do. (Interview 9, Row 118, translated from Swedish)

In the example above it is highlighted that it is one thing to have high standards and high ideals, but quite another to reach those ideals under the constraints of a particular project. The design quality of a product or service can therefore be seen in the light of the conditions under which it was produced.

Participants noted that a design project is performed in relation to technical conditions of what can or cannot be done within given financial constraints. The design project is often scoped in relation to already made decisions regarding technical platforms, or there might already be, for instance, a publishing system in place to which the design of a website needs to adapt. In such cases there must be a technical fit between the design and the existing technical context. Design projects are also performed in relation to organizational conditions of issues like roles and power structures that one cannot change and must adhere to.

The focus, when viewing design quality this way, is on the preconditions and the context of the design project; factors that are external to the interactive artifact as such.

Conception B: Design Quality as Delivering a Motivated Interactive Artifact

Design quality can be seen as delivering an interactive artifact motivated by different stakeholders. An example is provided below:

Yeah, well that is a question of design quality then. What is, what is good quality in… a design, a product that you have participated in developing then, service. And now you come back to you

know why did we build this in the first place, who are, what needs have we really been trying to satisfy. Both for users and customers and the organization as such. And that is of course, that is the answer to the question somehow. (Interview 3, Row 214.b, translated from Swedish)

In this example the participant returns to the question of why something was built in relation to latent needs of users, customers and organizations. The basis for design quality can thus be seen as whether an interactive artifact meets its purposes or not, given that the design fits the already existing technical and organizational contexts. The interactive artifact needs to have values in use for the people and the organizations it concerns. Values in use, exemplified by participants, may be to contribute to experiences, effectiveness and business utility.

A design can communicate a business strategy or contribute to strategic ways of working. A focus on experience and beauty, which is a higher standard than mere elegance, can also be part of the purpose of the interactive artifact in relation to a business strategy.

A focus on usefulness as an overarching goal is a more instrumental view than user experience. This view indicates efficiency in the organization, effects before form, design solutions that are sustainable over time, and meeting the user, customer and business needs behind the design brief.

Related to the purpose of the design are the intended and unintended effects of the design and the ethical consequences of those effects. The purpose of interaction design can also be to create new conditions for a strategic way of working, by supporting a particular way of using the interactive artifact in a specific situation.

The focus in this conception of design quality is on the motivations that drive people and businesses.

Conception C: Design Quality as Creating Opportunities for Usage of the Interactive Artifact and its Contents and Functions

Design quality can be seen as concerning the use of content and functions of the interactive artifact. An example is provided below:

Good design, it has to... fulfil a few requirements, it has to be something that fulfils the main objective of being something that is useful, you know? … So that people can really use it … in the most efficient and simple way. (Interview 1, Row 90–95)

In this example the participant started out in Conception B with "something that is useful" and then specified that to something that people can use in an efficient and simple way. The things that are used are functions and content of the interactive artifact. The use of the functions and contents of an interactive artifact must also be safe.

The focus in this conception of design quality is on qualities of the interactive artifact in use.

Conception D: Design Quality as Creating Opportunities for Experiences of the Interactive Artifact and its Form and Behaviour

Design quality can be seen as concerning experiences of form and behaviour of the interactive artifact. An example is provided below:

*On a personal level I think it's easy to talk about good and bad design insofar that a solution is kind of obviously elegant, right. That it is simple, it's clear, you have taken away lots of fuss that makes it easier to zoom through it, or it's cool, it has cool interaction, it's, it's kind of modern at the forefront of what's currently considered good interaction design. And form. (*Interview 3, Row 214.b, translated from Swedish)

In the example above, the same participant as in the example from Conception B, continues to describe his way of conceptualizing design quality by covering Conception C in terms of simple and clear usage, but he also covers the area of elegance and cool, modern or even interesting form. The form (including interactive form – i.e. behaviour) of the interactive artifact can accordingly also be the basis for design quality. It should ideally be interesting and modern, even though this may be an issue open to interpretation and taste.

Beside from interesting, the form and behaviour should as indicated by the example above, also be elegant in its simplicity and clarity. In this way of seeing design quality, beautiful form and behaviour follows function, and the aesthetics are contrasted to the practical.

The focus in this conception of design quality is on experiential qualities of the interactive artifact.

Space of Conceptions for Design Quality of the Interactive Artifact

The outcome space of design quality can be summarized as in Table 2.

Conception	Referential aspects	Structural aspects	Horizon
A	Design quality as managing constraints on the interactive artifact.	Focuses on preconditions and contexts of the design project.	External
B	Design quality as delivering a motivated interactive artifact.	Focuses on the purpose of the interactive artifact and how it meets the motivations that people and businesses have.	External, Internal
C	Design quality as creating opportunities for usage of the interactive artifact and its contents and functions.	Focuses on the use of the interactive artifact, and its functions and contents, and the qualities displayed in that use.	Internal
D	Design quality as creating opportunities for experiences of the interactive artifact and its form and behaviour.	Focuses on the experience of the form and behaviour of the interactive artifact, the qualities of the experience, and the constituents of the form language.	Internal

Table 2 Conceptions of design quality of the interactive artifact

In Table 2, the referential aspects refer to the meaning of design quality. The structural aspects refer to the discernment of the whole phenomenon, and its parts. In Conception A the whole is the design project; in B it is the people and the business; in C it is the use of the interactive artifact; and in D it is the experience of the interactive artifact. The parts discerned are preconditions and contexts in A, the purpose, motivations and goals in B, and qualities, functions and contents in C, and qualities, form, behaviour and form language in D.

The external horizon of design quality of the interactive artifact is the constraints for the design project in the specific situation that the designers find themselves in. The internal horizon, i.e. the parts and their relationships, of design quality of the interactive artifact consists of motivations and purposes, functions and content, behaviour and form.

The relations between the conceptions of design quality as well-designed interactive artifact can be represented as a logically inclusive structure in an outcome space. This is depicted in Figure 1, and it also illustrates the internal horizon (B, C and D), and the external horizon (A and B). B belongs to both the internal and the external horizon of experience, by forming the contours of the phenomenon, since the purpose belongs to the interactive artifact while the stakeholders' motivations belong to the context.
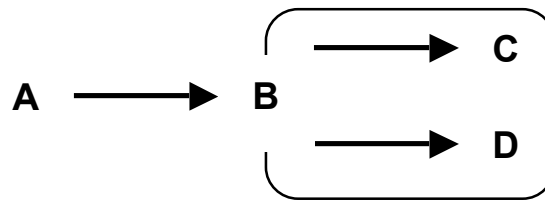
Figure 1 The hierarchy of logical relationships between conceptions of design quality of the interactive artifact

The figure means that Conception B is implied by Conception A since the conditions of the design project form the backdrop for the purpose of the interactive artifact. Conception B implies both Conception C and D in that the contents and functions, and their form and behaviour are means that contribute to the purpose, which is to deliver an interactive artifact that meets stakeholders' motivations and fit the context.

Discussion

The results can be interpreted using the theoretical frameworks for design quality presented in the introduction. Such an interpretation is depicted in Table 3.

	Conception	Design quality aspects
A	Design quality as managing constraints on the interactive artifact.	Structural, ethical, political.
B	Design quality as delivering a motivated interactive artifact.	Functional, aesthetic, ethical.
C	Design quality as creating opportunities for usage of the interactive artifact and its contents and functions.	Primarily functional, secondarily symbolical.
D	Design quality as creating opportunities for experiences of the interactive artifact and its form and behaviour.	Primarily aesthetic, secondarily symbolical.

Table 3 Relations between interaction designers' conceptions of design quality and design quality aspects derived from the theoretical framework

Conception A: Design quality as managing constraints on the interactive artifact, has to do with what can and cannot be done in terms of technical and organizational structure. It also has to do with political and ethical issues related to power structures. This conception belongs to the external horizon of design quality for the interaction designers, and is thus something they experience as framing but not something that is focal for them.

Conception B: Design quality as delivering a motivated interactive artifact, has to do with the purpose of the design and the motives of the stakeholders. It is about delivering value in use of the artifact, whether it is functional usefulness and strategic ways of working for users or organizations, or aesthetic experience.

Conception C: Design quality as creating opportunities for usage of the interactive artifact and its contents and functions, has primarily a functional dimension in simple efficient ways of using an artifact. In simplicity there are also symbolic or communicational dimensions since functions and contents need to be presented in a clear and efficient way.

Conception D: Design quality as creating opportunities for experiences of the interactive artifact and its form and behaviour, has primarily an aesthetic dimension in elegant behaviour and form. It is also concerned with a symbolic dimension in creating interesting experiences.

The results indicate accordingly that the participants conceptualized symbolic, social and communicational aspects as secondary to, or at least not separate from, functional and aesthetic dimensions. The functional also seems to come before the aesthetic. Both these aspects are conceived as instrumental to the purpose.

No interaction designer had only one conception of design quality. In fact, in order to discern qualities of a phenomenon (such as an interactive artifact) one needs to experience variation in that which is discerned (Marton & Booth, 1997). One way to achieve variation of experiences is to actively shift conceptions (Hult, Irestig & Lundberg, 2006). Both Gann et al. (2003) and Ehn & Löwgren (1997) indicate this when arguing that a specific feature or quality does not belong to only one quality aspect. Participants in this study constantly moved between conceptions in their reasoning.

Verplank has three questions an interaction design has to answer (Moggridge, 2007): How do you do, know, and feel? An interaction designer does, however, not directly shape how people do, know and feel. He or she can only indirectly affect these issues. So what is it interaction designers do shape directly? It has been argued that it is the conditions for interaction that are shaped (Arvola, 2005; Hernwall & Arvola, 2008). Although not the focus for this study, the results indicates that shaping these conditions includes deciding the form and behaviour at the surface of the interactive artifact, and deciding the functions and content at its core, in relation to contextually dependent purposes and motives for users and businesses.

When interpreting the results of this study some caution is called for. The interview material analyzed here has to do with how interaction designers talk about design quality in general. It is not connected to specific design projects, and it is not situated in design action. An analysis of project specific quality judgements, or situated quality judgements may show that they in reality reason differently from how they say they reason. Future research will have to tell.

The results do not represent the full range of possible ways of conceptualizing design quality for this group at this time. Such a study would not be possible to conduct. All participants were from Sweden and Finland, and most of them had an educational background in cognitive science and human-computer interaction with an interaction design profile. Another sample may disclose other ways of seeing design quality in interaction design.

Design quality is always a topic for discussion in the design community, but do we talk about the same thing? The results would be interesting to contrast with the conceptions human factors specialists, industrial designers, graphic designers, and engineering designers have. Or why not game designers or artists in interactive art?

At face value, the results may seem equally applicable to industrial designers or graphical designers as to interaction designers. If we, however, look at the results more closely we see issues like supporting specific ways of working and interacting among users in organizations, and we find issues about behaviour, and combinations of content and functions of interactive artifacts that are typical to the interaction design discipline.

Conclusions

Four different conceptions that interaction designers have about design quality for interactive artifacts were identified, and they can be expressed in a condensed form as: (a) Constraints & contexts, (b) motivations & purposes, (c) use-qualities of functions & content, and (d) experiential qualities of form & behaviour. An awareness of these conceptions may facilitate researchers, students, practitioners, critics, and managers of interaction design in their appreciation of different aspects and opportunities of a design situation.

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