

The Usability of Usability Guidelines - a Proposal for Meta-Guidelines

Stefan Cronholm

Linköping University
581 83 Linköping, Sweden
University of Borås
501 90 Borås
stefan.cronholm@liu.se

ABSTRACT

This paper is challenging the usability of traditional usability guidelines. The claim is that guideline descriptions and explanations are not satisfactory. Analysis results demonstrate vagueness and are ambiguous in explanation. The aim of the paper is to propose a set of principles (meta-guidelines) to be used for improving the usability of guidelines.

Author Keywords

Usability guidelines, usability criteria, usability principles

ACM Classification Keywords

H.1 Models and principles

INTRODUCTION

There exist a lot of guidelines or criteria for designing IT-systems (e.g. Nielsen, 1994; Häkkinen & Mäntyjärvi, 2006; Kärkkäinen, L. & Laarni, 2002; Muller, et al., 1998; Shneiderman, 1998). Good usability is the main goal of interface design. Despite this, there are still many ill-designed IT-systems (Park & Kim, 2000). One reasonable question to ask is: are the proposed guidelines not used and if so why not? The main goal of guidelines is to increase the usability of human-computer interaction (Burmester & Machate, 2003). Guidelines are based on theories, empirical data and good practical experiences. A guideline is defined as “information intended to advise people on how something should be done or what something should be” Cambridge Dictionaries Online. (2009).

The aim of this paper is to question if popular usability guidelines are usable and to propose a set of principles for formulating guidelines. Are they described in a way that usability practitioners understand their meaning and how they should be used? The primary target group of these results is constructors of usability guidelines (see figure 1). Figure 1 is describing the relations between user interaction and the principles proposed. The bottom level represents the business level where a user interacts with an IT-system. At the second level a designer is using usability guidelines for designing an IT-system. At the third level a constructor is using theories, principles and

empirical experiences in order to construct guidelines. Finally, at the top level a constructor is using theory, existing guidelines and empirical experiences in order to propose principles for how to construct or design usable guidelines. As figure 1 demonstrates, the ultimate aim of the principles is to support the usability of IT-systems. We define usability as “a set of attributes that bear on the effort needed for use, and on the individual assessment of such use, by a stated or implied set of users” (AS/NZS_42169).

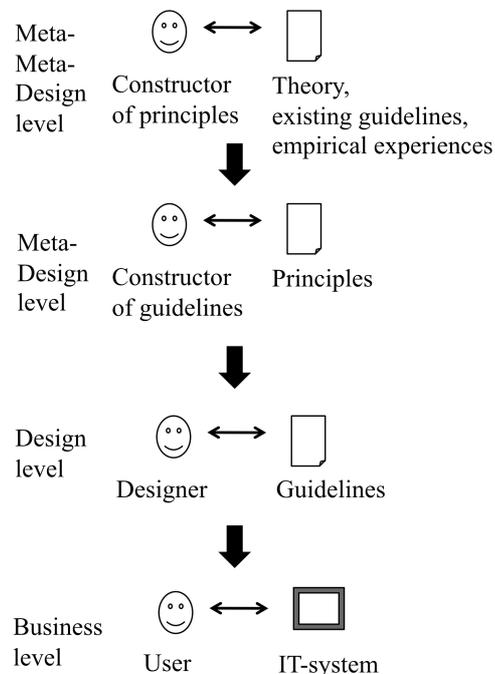


Figure 1. The relation between different levels.

In the literature, there are several explanations of why guidelines are not used. Vredenburg et al. (2002) point out that there is a major discrepancy between the commonly cited guidelines and the actually applied ones. The work by Tao (2008) has identified a significant gap between the knowledge of design and application of web design guidelines. Furthermore, according to Chevalier & Ivory (2003), there is little support for the complexities involved in the design activity. According to Gerlach & Kuo (1991) design work is more intuitive than systematic. Gould & Lewis (1985) claim that design guidelines are limited since their descriptions are not detailed enough.

According to Burmester and Machate (2003), the designer has to understand the rationale behind the guidelines before applying them. These criticisms described refer to a lack in current descriptions of guidelines and motivate a review of how existing guidelines are described.

A reasonable condition for adopting commonly cited guidelines is that they are expressed in an understandable way. They must be clearly formulated and answer questions like: what is this guideline about, what will I achieve by using this guideline, how should I use this guideline and are there any examples provided.

We have also noticed that usability guidelines usually are presented as flat lists (Nielsen, 1994; Häkkinen & Mäntyjärvi, 2006; Kärkkäinen, L. & Laarni, 2002; Muller, et al., 1998; Shneiderman, 1998). A flat list is an uncategorized list. According to Cronholm & Bruno (2008, 2009) guidelines can reside on different abstraction levels. An example is “Visibility of system status” (Nielsen, 1994) and “Match between the system and real world” (Nielsen, 1994). Clearly, the latter guideline resides on a higher abstraction level than the former one does. We claim that usability guidelines are better understood if they are categorized into different abstraction levels. The advantage and role of a multilevel abstraction hierarchy is discussed in Rasmussen et al. (1994). Rasmussen et al. compares a multilevel abstraction hierarchy with a means-end hierarchy and claim that a multilevel abstraction hierarchy is often used in practical problem solving processes.

The question we ask is related to research performed by Gerlach & Kuo (1991). The aim of their work is to enable design practice to become more systematic and less intuitive than it is today. This aim touches upon the aim of this study. The result of this study could be viewed as a recommendation to formulate guidelines in a more categorized and systematic way. Offering guideline descriptions that are more understandable will increase the conditions for practitioners in choosing relevant usability guidelines and to use them more carefully. In the following section we present the research approach and the theoretical basis used. In section 3 the findings are presented. Finally, conclusions are drawn in section 4.

THEORETICAL BASIS

In order to propose a set of principles for describing guidelines we have been inspired by both theory and existing guidelines (see section Presentation of guidelines analyzed). A guideline is defined as a standard on which a judgment or decision may be based Merriam-Webster's Collegiate Dictionary (2009). It is a basis for comparison, like a reference point against which other ‘things’ can be evaluated. A principle is a meta-guideline. A meta-guideline is a guideline for judging or evaluating guidelines. A meta-guideline resides on a higher level than a guideline and is therefore a guideline of second order.

The theories we have used for deriving analysis principles are ontological determination and linguistic determination. The basic idea of ontology is to understand how

the world or ‘things’ are disposed (Goldkuhl, 2002). The aim is to describe the character of or the attributes that shape a ‘thing’ or an object. Furthermore, followers of ontology postulate that ‘things’ can be subdivided into different levels. The ontological analysis has been used for: 1) identifying attributes that constructors of guidelines have been used when describing guidelines and 2) to identify if different levels of guidelines are presented.

If ontological determination is interested in how the world is shaped, then linguistic determination is interested in how we talk about the world (Goldkuhl, 2002). We have used language determination in order to understand the form of language used when describing guidelines. This view on use of language is inspired by work of Ludwig Wittgenstein (1958a, 1958b). According to Wittgenstein one should, among other things, be careful about the use of nouns. Wittgenstein claims that many concepts are given the form of a noun instead of the original adjective form. We normally name this the noun disease. Non-reflected transferring of adjectives or verbs to nouns can lead us to wrongly thinking that there is an object or thing behind the noun when the noun in fact reflects an attribute of an object or a verb.

Our view of usability guidelines is that they represent recommendations and that they are directed towards designers or evaluators. Our interpretation of the meaning of a recommendation is that it should contain both a verb and a noun; i.e. a recommendation to a designer to do something (verb/action) about something (noun/object). Using verbs/actions and nouns/objects together can be viewed as more active way of using the language. An example of a formulation of a guideline description following this form is presented by Shneiderman (1998): “Strive for consistency”. The formulation “error prevention” by Nielsen (1994) is an example of a formulation when the verb is missing. We are not saying that there should be an over-use of verbs; rather we are proposing that verbs should be used together with nouns.

RESEARCH APPROACH

In order to generate principles we have used theories, perceptions of designers and two lists of usability guidelines. The knowledge generated is thereby triangulated by the use of different knowledge sources. The theories used are described above (see section Theoretical basis). Perceptions of designers are gathered by interviews. We have interviewed five usability experts about their opinions about the selected guidelines (see below). The usability experts are employed by different Swedish companies. Their main assignments concern development of web based IT-systems like e-services. Three of them have more than 10 years experience and two less than two years.

We have also induced principles by analysing existing guideline descriptions. Two familiar lists of guidelines are chosen; ten heuristics (Nielsen, 1994) and eight golden rules (Shneiderman, 1998). According to Google Scholar both these publications are highly refereed. That means that these publications have had a significant im-

pact on design and usability work. In order to induce principles we have used the generic questions: Why, what, how and to whom (who is addressed). We have also been inspired by a question batteries proposed by Strauss & Corbin (1998) and Cronholm & Goldkuhl (2006). Examples of questions borrowed from these batteries are: “What is this sentence about?” and “Why is this formulation hard to comprehend?”.

We have analyzed the guidelines individually and the lists as a whole. The aim of analysing the lists as a whole is to understand if individual guidelines are described in a similar way and if relations between guidelines are expressed. The research approach is pictured in figure 2. There has been a direct access and an indirect access to the usability guidelines. A direct access means that we have studied the analyzed the guidelines by ourselves. An indirect access means that we have analyzed designers’ perceptions of the guidelines.

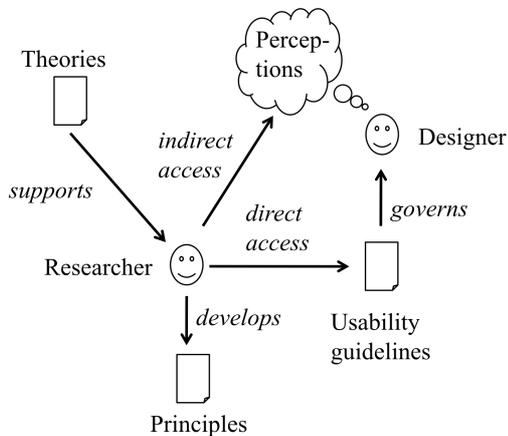


Figure 2. The relation between knowledge sources and development of principles.

PRESENTATION OF GUIDELINES ANALYZED

The ten heuristics are originally developed by Rolf Molich and Jacob Nielsen (1990). The heuristics have been refined in Nielsen (1994) in order to “derive a set of heuristics with maximum explanatory power.” Nielsen (2009). This quote represents very much what this paper is challenging. The ten heuristics read:

Guideline	Description
Visibility of system status	The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.
Match between system and the real world	The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

User control and freedom	Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.
Consistency and standards	Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.
Error prevention	Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.
Recognition rather than recall	Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.
Flexibility and efficiency of use	Accelerators -- unseen by the novice user -- may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.
Aesthetic and minimalist design	Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.
Help users recognize, diagnose, and recover from errors	Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.
Help and documentation	Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

Table 1. Ten Heuristics (Nielsen, 1994).

The eight golden rules are developed by Ben Shneiderman and published in “Describing the User Interface” (1998). “Describing the User Interface” has been published in several editions. The first one is dated 1987 and the last one is dated 2009. Shneiderman proposed this collection of principles that are derived heuristically from experience and applicable in most interactive systems after being properly refined, extended and interpreted. The eight golden rules are claimed to be a guide to good

interaction design (Shneiderman, 1998). They read:

Guideline	Description
Strive for consistency	Consistent sequences of actions should be required in similar situations; identical terminology should be used in prompts, menus, and help screens; and consistent commands should be employed throughout.
Enable frequent users to use shortcuts	As the frequency of use increases, so do the user's desires to reduce the number of interactions and to increase the pace of interaction. Abbreviations, function keys, hidden commands, and macro facilities are very helpful to an expert user.
Offer informative feedback	For every operator action, there should be some system feedback. For frequent and minor actions, the response can be modest, while for infrequent and major actions, the response should be more substantial.
Design dialog to yield closure	Sequences of actions should be organized into groups with a beginning, middle, and end. The informative feedback at the completion of a group of actions gives the operators the satisfaction of accomplishment, a sense of relief, the signal to drop contingency plans and options from their minds, and an indication that the way is clear to prepare for the next group of actions.
Offer simple error handling	As much as possible, design the system so the user cannot make a serious error. If an error is made, the system should be able to detect the error and offer simple, comprehensible mechanisms for handling the error.
Permit easy reversal of actions.	This feature relieves anxiety, since the user knows that errors can be undone; it thus encourages exploration of unfamiliar options. The units of reversibility may be a single action, a data entry, or a complete group of actions.
Support internal locus of control	Experienced operators strongly desire the sense that they are in charge of the system and that the system responds to their actions. Design the system to make users the initiators of actions rather than the responders.
Reduce short-term memory load	The limitation of human information processing in short-term memory requires that displays be kept simple, multiple page displays be consolidated, window-motion frequency be reduced, and sufficient training time be allotted for codes, mnemonics, and sequences of actions.

Table 2. Eight Golden Rules (Shneiderman, 1998).

RESULTS

The following analysis aims at proposing principles for how to formulate guidelines. In the first subsection below the results from the interviews of usability experts are presented. In the following subsection, results have been generated by analysing the two lists through inducing principles and through using theories. In the last subsection a summary of the generated principles is presented.

Analysis results

Results from interviews

All the interviewed usability experts are familiar with the ten heuristics (Nielsen, 1994) and the eight golden rules (Shneiderman, 1998). The overall result is that none is slavishly following the usability guidelines. Their answer to the question "Do you use usability guidelines for design or evaluation?" was at first "no, not really". After refining the question they agreed that usability guidelines are implicitly used. All the usability experts are implicitly using guidelines that are primarily based on experiences from earlier assignments.

Their answer of the question "why are you not using the familiar and well-known ten heuristics and eight golden rules?" was: "they are not good enough, they don't correspond to my needs", "they are not detailed enough", "they are too general" and "they don't tell me how to do". In summary most of the answers are negative towards the guidelines. A positive answer reads: "I have used some of them as inspiration".

Another experience concerned a situation where multiple evaluators were engaged. It often proves difficult for evaluators to reliably interpret the guidelines and identify the same usability issues. The answers contain several possible candidates for generating principles such as relevance ("correspond to my needs"), level of detail, abstraction level and how to do.

Results from analyzing the guidelines

By asking the question "why is this guideline important" the principle of *relevance* is generated. Many of the guideline descriptions are formulated as a motivation of why something is important. Examples of sentences that motivate the guidelines are "Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state" (see User control and freedom) and "Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility" (see Aesthetic and minimalist design).

By reading the guideline descriptions it is also obvious that the *language form* consists of both objects and actions, that is, the principles of *what-to-do* and *how-to-do* are generated. Examples of what to do are "... appropriate feedback ..." (see Visibility of system status) and "Accelerators ..." (see Flexibility and efficiency of use). The guideline descriptions contain several examples of what to do and how to do. But there are no illustrative concrete examples provided. The guidelines are formu-

lated as “Support undo and redo” (see User control and freedom and “As much as possible, design the system so the user cannot make a serious error” (see Offer simple error handling). The descriptions are not informing the designer about how to do on a more concrete level.

The *abstraction level* used for most of the guideline description is considered as fairly concrete. Examples of concrete descriptions are: “For every operator action, there should be some system feedback” (see Offer informative feedback) and “Follow platform conventions” (see Consistency and standards). When reading the labels of the guidelines and their corresponding descriptions, it is obvious that some of them reside on different *abstraction levels*. There is no doubt that “User control and freedom” is a relevant guideline. The description is clear and understandable. But there is a problem with the abstraction levels used. The label is formulated on high abstraction level and the description is formulated on very concrete level. Does not the guideline “User control and freedom” embrace more than undo and redo? The problem of different abstraction levels is also valid for the guideline “Flexibility and efficiency”. It is hard to understand why flexibility is limited to the use of accelerators and why flexibility is limited to allow a user to tailor frequent actions. Do “Flexibility and efficiency” not address more than accelerators and tailoring? Clearly, the label is formulated on a higher abstraction level than the text below.

In the label of the guideline “Match between system and the real world” the concept of “real world” is used while the concept of users’ language is used in the description. It seems like these two concepts have been mixed up. The use of mixed up concepts contributes to confusion. According to our understanding a more preferable term to use is “usage context”. From this observation the principle of *comprehensible* is generated.

By reading the guideline “Enable frequent users to use shortcuts” it is clear that the guideline addresses frequent users; not expert users. Our interpretation is that there is confusion about frequent users and expert users. A frequent user does not have to be an expert user that prefers accelerators. This observation generates the principle of *precision*. The precision of what is talked about is not sufficient. Elaborating on the concepts of expert and frequent users made us think about the opposite concepts; novice users and non-frequent users. The label is limited to address expert users. This reflection has generated the principle of *exclusive/inclusive*.

Furthermore, analysing the guideline “Aesthetic and minimalist design” reveals that the description is explaining “minimalism” but there is no explanation for “aesthetic”. Omitting “aesthetic” has generated the principle of *completeness*.

So far, analysing the guidelines one by one has generated the principles. The next step is to analyse the lists of guidelines as a whole. By asking the question of *who* is addressed in the guideline descriptions it is clear that the

guideline constructors are “talking” to a designer/evaluator.

Looking closer at the ten heuristics reveals that there is a difference in how the guideline descriptions are expressed. There are some descriptions that end with concise imperative and give the impression to function as a summary of the whole description of the guideline. Examples are “Support undo and redo” (see User control and freedom) and “Follow platform conventions” (see Consistency and standards). This way of expressing the guideline is not used in several other descriptions. This observation generates the principle of *homogeneous structure*.

Another observation made is that most of the ten heuristics consist of two concepts in the label. For some of them it is unclear why these two concepts are grouped. For example, “User control and freedom” is grouped. The link is not explained. It is questionable if freedom always should be seen as something positive. Treating user control and freedom, as two separated guidelines will probably make them easier to explain. It is also questionable why “Flexibility and efficiency of use” are related. According to our understanding flexibility and efficiency represent two different categories. If two powerful concepts like flexibility and efficiency should be grouped together, it is necessary to inform why and how they are related. The guideline “Aesthetic and minimalist design” can be criticised in the same way. The list of eight golden rules is not grouping guidelines of different character. This observation has generated the principle of *strive for simplicity*.

As said above, it is not obvious why “Flexibility” and “Efficiency” are discussed together. Rather, concepts discussed together should be related in order to improve the understanding. Related concepts can be adjacent concepts and contradictory concepts. Adjacent concept can be used for describing different aspects and thus enable an improved understanding (McQuaill, 2005). Using contradictory concepts is based on Hegel’s method of logic. The method is based on the concept of advancing contradictory arguments, of thesis and antithesis (Croce, 1985). A contradictory argument to flexibility is standardization. Discussing flexibility and standardization in the same guideline will support the designer’s understanding of a larger wholeness. In order to increase the understanding, this observation has generated the principle of *describe adjacent and contradictory concepts in the same context*.

Finally, both lists are presented as flat lists. It seems like most of them have relations to other guidelines. The guidelines can be examples of other guidelines or they reside on a higher abstraction level. The advantage of using multilevel abstraction hierarchy is discussed in section 1. This observation has generated the principle of *categorisation*. Examples of guidelines that probably are related to other guidelines are: “Consistency and standards” seems to be related to “Match between the system and the real word”. Both are informing about the import-

ance of following conventions. Another example is “Error prevention”; preventing users from doing mistakes or errors relates to “support undo and redo” (see User control and freedom). Preventing is referred to a situation before the action is performed and “support undo or redo” refers to a situation after the action is performed.

Referring to a situation after the action is wrongly performed is normally referred to as error recovery (Shneiderman, 1998). According to our understanding, error handling is a process of its own that should be supported by all the other guidelines. The categorisation of the heuristics can thereby be questioned. An alternative is to discuss error handling as a whole instead of splitting error handling into different guidelines (see also “Help users to recognize, diagnose and recover from errors”).

Summary of principles

The analysis has demonstrated that the descriptions of the analysed guidelines can be improved. Based on this analysis a set of principles has been generated. The generated principles are: *relevance*, *language form*, *what-to-do*, *how-to-do*, *abstraction level*, *precision*, *exclusive/inclusive*, *completeness*, *who-is-addressed*, *homogeneous structure*, *strive for simplicity*, *categorisation*, and *describe adjacent and contradictory concepts in the same context*.

The principle of *relevance* is a recommendation for why a specific guideline is important to consider while designing or evaluating an IT-system. The formulation of this guideline should also inform the designer/evaluator of for whom this guideline is relevant, when it is relevant and for which specific situation it is applicable. An IT-system is not supporting any situation; the aim of an IT-system is to support a specific business and its specific business goal. It should be clear to a designer if a guideline is applicable or not to the specific situation at hand.

The principle of *language form* refers to how the description of the guideline is formulated. A guideline is per se a recommendation or guideline. In our opinion the description should therefore be expressed in active form instead of a more passive descriptive form. In an active form, the formulation is an imperative to a designer/evaluator. The imperative consists of a verb/action together with a noun/object. An imperative informs the designer/evaluator clearly about *what-to-do*. There should be no hesitation of what the designer/evaluator is to achieve. The language used should therefore be clear and simple. In order to achieve the recommendation of *what-to-do* a guideline description should also consist of a proposal of *how-to-do*. To support the description of *how-to-do* illustrative examples can be provided.

The principle of *abstraction level* refers to the label of the guideline and the description of the guideline should be in accordance. We are encouraging guideline descriptions that consist of different abstraction levels since the use of abstraction levels support the comprehensibility. The traceability between the abstraction levels should be visi-

ble. If there is a gap between abstraction levels the risk of confusion is obvious.

The principle of *precision* has to do with the meaning of concepts. The choice of concept should be done carefully and the concept chosen should be precise enough in order to avoid confusion. Furthermore, concepts should be problematized in accordance to the principle of *exclusive/inclusive*.

All concepts used, either in the label or in the description, should be explained. If explanations are omitted there is a risk for confusion that may lead to the guidelines being abandoned. The principle of *completeness* recommends that the guideline descriptions consist of an internal logic and cohesion.

The principle of *who-is-addressed* should be perceived as a recommendation to check that all the guideline descriptions are addressing the right addressee. There should be no confusion of to whom the descriptions are directed.

The principle of *homogeneous structure* concerns the structure of the descriptions. All the guideline description should consistently, if possible, be constructed after the same underlying model. A good idea can be to start with a description of why this guideline is important, explain the concepts used and end with short and concise imperative together with an illustrative example.

The principle of *strive for simplicity* is encouragement to not include unrelated concepts in the same guideline description. For all the concepts included, relations should be clearly expressed. Involving unrelated concepts in the same description will increase the complexity and thereby reduce the comprehensibility.

The principle of *categorisation* concerns the grouping of the guidelines proposed. Obviously, there are relations between guidelines. Instead of presenting them as a flat unordered list related guidelines should be categorised. Categorising guidelines means that different levels of guidelines are identified. Categories can be divided into sub-categories and they can be abstracted to higher levels. According to Rasmussen et al., categorising guidelines supports practical problem solving processes (Rasmussen et al., 1994).

The aim of the principle *describe adjacent and contradictory concepts in the same context* is to provide a richer description and to reduce the risk of the guideline to be perceived as being too simple or too naive. By discussing different related concepts together the guideline will hopefully be perceived as more informative and supportive.

The principle of *comprehensible* proposes that the concepts and expressions used should be familiar and that the guideline descriptions should be understandable. The recommendation of familiarity is similar to the idea behind the guideline “Match between system and the real world”. Replace the word “system” with “guideline description” and the word “real world” with the “practitioners’ language” and the need of the familiarity aspect is

considered. *Comprehensible* can also be viewed as a result of how successfully all the other principles have been implemented. That is, the comprehensibility of a guideline description will increase if the formulations are described according to the principles proposed.

In figure 3 the principles are categorized into a hierarchy. Instead of presenting the principles as a flat list the aim of the hierarchy is to support the understanding of how the principles are related to each other. A flat list can virtually provide a good overview of its content; but the structure is too simplified and can thereby blindside the user. Designing IT-system is a complex task and consequently we need tools that support complexity.

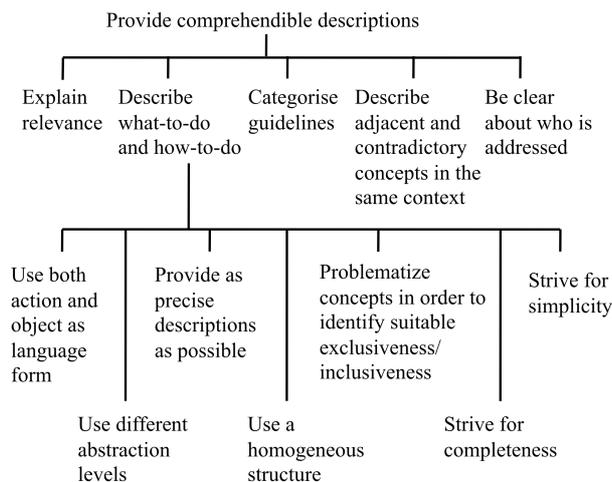


Figure 3. Categorization of principles.

CONCLUSIONS

The analysis of this study has revealed vagueness and ambiguousness in the analyzed usability descriptions. The aim of guidelines is to support designers/evaluators when designing/evaluating IT-systems. The primary aim of the principles is to support constructors in describing the guidelines, but the ultimate aim is to support human-computer interaction. At first sight the distance between the top level and the bottom level in figure 1 can be perceived as too complex. There is communication transferred between:

- Researcher and constructors of guidelines
- Constructors of guidelines and designers
- Designers and IT-system

The risk of communication failure or misunderstanding along the way is obvious. For almost all design situations the meaning of a guideline is a matter of interpretation. We agree, but nevertheless usability guidelines should be described in a way that they are perceived as usable. The aim of this study is to reduce the risk of communication failure. The proposal can therefore be interpreted as an imperative to provide good descriptions.

Related questions to this study are “is a guideline worth following?” and “how do I know that using a guideline will result in a more usable IT-system?”. According to our knowledge there are no studies that present any evi-

dence of improvements of using guidelines. Spool (2009) supports the question in this study by claiming that a condition for measuring guidelines is that they are measurable Spool (2009). The claim of Spool can be viewed as another motive for providing usable descriptions.

Van Welie (1994) discusses guidelines and heuristics as means for assistance in improving the usability while designing. Furthermore they claim that in practice the available checklists, tests, guidelines etc. differ in terms of structure, content and terminology. Their claim supports the need of more descriptive guidelines.

A proposal for future research is 1) describe guidelines according to the principles and 2) test the guidelines in real development/evaluation projects. Spool [30] discusses the problem of measuring guidelines and claims that a condition for being successful in testing guidelines is that they are well described. Spool also discusses the risk of using untested guidelines and claim that the use of tested guidelines is a key to success.

The analysis has revealed some major deficiencies in how to describe and explain usability guidelines. Despite this, the guidelines have had a major impact and on both practitioners and academics around the world. The question “How come” is of course of interest but is outside the scope of this paper. This work should not be perceived as finished; rather it is a start for further elaboration on recommendations for how to describe principles.

REFERENCES

- AskOxford. Oxford Dictionaries. <http://www.askoxford.com>. Accessed Jan 30, 2009.
- AS/NZS_4216. "Information technology—Software product evaluation—Quality characteristics and guidelines for their use," 0 7262 9071 8, Australian/New Zealand Standard, Homebush NSW 2140 Australia, Wellington 6001 New Zealand, p. 20.
- Burmester, M., Machate J. Creative Design of Interactive Products and Use of Usability Guidelines - a Contradiction, in Human-Computer Interaction: theory and practice (eds Julie A. Jacko, Constantine Stephanidis, Don Harris). Lawrence Erlbaum Associates, (2003).
- Cambridge Dictionaries Online. (2009). <http://dictionary.cambridge.org/>. Accessed May 18, 2009.
- Chevalier, A., Ivory, M.Y., Web site designs: Influences of designer's expertise and design constraints. International Journal of Human-Computer Studies, 58,1 (2003), p. 57-87.
- Croce, B. What is Living and What is Dead of the Philosophy of Hegel, University Press of America. (1985).
- Cronholm, S., Goldkuhl, G. Involving Novice Users in Document-Driven System Requirements Analysis. In Journal of Information, Information Technology, and Organizations, Vol 1, (2006). pp. 131-149.
- Cronholm, S., & Bruno, V. Usability of IT-Systems is More than Interaction Quality – The Need for Com-

- munication and Business Process Criteria. Accepted to the 17th European Conference on Information Systems (ECIS). June 8-10, Verona, Italy. (2009).
- Cronholm, S., & Bruno, V. Do you Need General Principles or Concrete Heuristics? - a Model for Categorizing Usability Criteria. Accepted to Australasian Computer-Human Interaction Conference (OZCHI). Cairns, (2008).
- Gerlach, J.H., Kuo, F.Y., Understanding Human-Computer Interaction for Information Systems Design. *MIS Quarterly*, 15,4 (1991), p. 527-549.
- Goldkuhl, G. Anchoring scientific abstractions – ontological and linguistic determination following socio-instrumental pragmatism, in Proceedings of European Conference on Research Methods in Business, Reading. (2002).
- Gould, J.D., Lewis, C. Designing for usability: key principles and what designers think. *Commun. ACM*, 28,3. (1985) p. 300-311
- Häkkinen, J., Mäntyjärvi, J. Developing design guidelines for context-aware mobile applications, ACM International Conference Proceeding Series; Proceedings of the 3rd international conference on Mobile technology, applications & systems. Bangkok, Thailand, ACM. (2006).
- Kärkkäinen, L. & Laarni, J. Designing for small display screens, ACM International Conference Proceeding Series; Proceedings of the second Nordic conference on Human-computer interaction. Aarhus, Denmark, ACM, (2002). p. 227-230.
- McQuaill D. *McQuaill's Mass Communication Theory*. Sage Publications Ltd (2005).
- Merriam-Webster's Collegiate Dictionary. <http://www.merriam-webster.com/>. Accessed Jan 30, 2009.
- Molich, R., Nielsen J. Improving a human-computer dialogue, *Communications of the ACM* **33**, 3 (March), (1990), 338-348.
- Muller, M.J., et al., *Methods & Tools: participatory heuristic evaluation, in interactions*. (1998). p. 13-18.
- Nielsen J. Heuristic Evaluation. In Nielsen, J. and R.L. Mack R.L. (eds), *Usability Inspection Methods*, John Wiley & Sons, New York, (1994).
- Nielsen, J. http://www.useit.com/papers/heuristic/heuristic_list.html. Accessed 18 May 2009.
- Nielsen, J., Molich R. Heuristic evaluation of user interfaces. In Proceedings of the SIGCHI conference on Human factors in computing systems: Empowering people. Seattle, Washington, United States: ACM. 1990.
- Park, J., Kim, J. Effects of contextual navigation aids on browsing diverse Web systems. In Proceedings of the SIGCHI conference on Human factors in computing systems. (2000).
- Rasmussen, J., Pejtersen, A.M., Goodstein L.P. *Cognitive Systems Engineering*, Wiley & Sons Inc, (1994).
- Shneiderman, B. *Designing the user interface: Strategies for effective human-computer-interaction*. 3rd ed, Addison Wesley Longman, Reading, Mass, (1998).
- Somervell, J., McCrickard D.S. Better discount evaluation: illustrating how critical parameters support heuristic creation. *Interacting with Computers*, 17,5 (2005), p. 592-612.
- Strauss A., Corbin. J. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. Sage Publications, Thousands Oaks, CA. (1998).
- Spool, J.M. 'Evolution trumps usability guidelines', www.uie.com. (2002). Accessed 5 May 2009.
- Tao, Y.-H. Information system professionals' knowledge and application gaps toward Web design guidelines. *Computers in Human Behavior*, **24**,3 (2008), p. 956-968.
- Vredenburg, K., Mao J.Y.; Smith P.W., Carey T. A survey of user-centered design practice. in Proceedings of the SIGCHI conference on Human factors in computing systems: Changing our world, changing ourselves. Minneapolis, Minnesota, USA: ACM Press, 2002.
- van Welie, M., Van Der Veer, G. C., Eliëns, A. Breaking down Usability. In proceedings of Interact '99. Edinburgh, Scotland 30th August - 3rd September, 1999.
- Wittgenstein, L. *The Blue and Brown books. Preliminary studies for the "Philosophical investigations"*, Basil Blackwell, London. (1958a).
- Wittgenstein, L. *Philosophical investigations*, Basil Blackwell, London. (1958b).