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Bridging diversity: a deliberative approach to organizing and application of usability guidelines

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BRIDGING DIVERSITY: A DELIBERATIVE APPROACH TO THE ORGANIZATION AND APPLICATION OF USABILITY GUIDELINES

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Abstract

Designing interaction for the global society entails addressing multiple issues and challenges, ranging from the technical and economic to the legal and ethical. Usability guidelines recommend or prescribe courses of action and thus play a significant role in designing universally usable systems. Approaches to organizing and applying usability guidelines need to support processes of deliberation and tradeoff, especially when designing for bridging diversity in shared interaction contexts. This paper describes a deliberative approach to addressing some of these design challenges in a rational way. It argues for organizing guidelines by using concepts from Habermas's discourse theory and Toulmin's model of argumentation. Application of the approach is illustrated through a set of research-based Web design and usability guidelines. This paper contributes to the HCI literature by providing a theory-based approach to managing and deliberating on many usability guidelines and related usability issues.

Keywords: Usability Guidelines, Discursive Evaluation, Universal Usability, Reflective Design, Meta-Communication

1 INTRODUCTION

Human and social aspects have been the focus of many Human-Computer Interaction (HCI) studies (e.g., Winograd & Flores 1986; Brown & Duguid 1994). The *social technical gap*, that is, the divide between what we *know* we must support socially and what we *can* support technically, is viewed as one of central problems of HCI (Ackerman 2002). Arguing on the same lines, some HCI researchers emphasize the need for supporting distributed cognition and informed participation in order to transcend the individual human mind and to construct a shared understanding among various stakeholders (e.g., Arias et al. 2000; Muller 2001). Others address global challenges for HCI because of differences in technologies, signs, actions, norms and values (e.g., Yetim 1998; Schneiderman 2000; Smith & Yetim 2004). Recently, HCI studies have attracted increasing attention within the Information Systems field, with a focus on human interaction with information, technologies, and tasks, especially in organizational contexts (Zhang & Li 2005). It appears to be widely accepted that designing both local and global interaction needs to take into account open and evolving contexts and to consider a broad range of issues including the technical, aesthetic, economic, legal and ethical ones.

Usability guidelines representing design experiences are one of the most enduring success stories in HCI (Schneiderman 2003). They support design practice with useful sets of recommendations or prescriptions, and thus play a significant role in designing universally usable systems. They remind designers, usability specialists, and managers of the wide range of local and global issues. Nevertheless, guidelines themselves are subject to discussion and negotiation. They may provoke discussions among designers and researchers about which guidelines are most relevant as well as among designers, managers, and users with their conflicting preferences and interests. Thus, construction of a useful and valid set of guidelines and the application of the most appropriate ones needs to be justified, balanced and traded off. However, there is a lack of a theoretically well-founded approach to organizing and deliberating on design guidelines, that is, an approach that also can do justice to the general requirements in the context of HCI, such as considering the dynamic and distributed nature of expertise and the diversity of interests, and supporting informed participation of those affected.

This paper describes a deliberative approach to addressing some of these design challenges in a rational way. The approach uses a discourse-based meta-communication model, which was originally suggested to support reflections on broad issues in local and global interaction contexts (Yetim 2005 & 2006). The model is based mainly on Habermas's (1984) discourse theory. In addition, the proposed deliberative approach makes use of Toulmin's (1958) model of argumentation in order to represent usability guidelines in a way that allows reflection on them. Reflection plays a central role in both Habermas's discourse theory and in Toulmin's model of argumentation, which are interrelated and have already been considered as relevant theoretical bases for reflective practice in the Information Systems field (e.g., Hirschheim et al. 1996; Klein & Hirscheim 2001, Ulrich 2001). In accordance with this view, this paper argues in favor of integrating insights from both theories for reflective practice within the context of HCI. The applicability of the proposed approach is illustrated by a set of research-based Web design and usability guidelines. This paper claims to contribute to the HCI literature by providing a theory-based approach to managing and deliberating on many usability guidelines and related usability issues.

The paper is organized as follows: Firstly, we reflect briefly on three orientations in HCI research to emphasize their implicit assumptions and possible consequences for designing interactions. Secondly, we introduce the basic concepts of a discourse-based model for supporting deliberative practice in HCI, and then discuss how this model can be used for organizing usability guidelines. In addition, we illustrate the application of the approach to categorize a set of research-based Web design and usability guidelines, and finally offer some discussion and conclusions.

2 MULTI-, TRANS-, AND INTERCULTURAL ORIENTATIONS IN HCI

Designing interaction for local and global contexts entails many assumptions and values. Values, at least implicitly, play a role in designing any artifact (e.g., Kumar & Bjorn-Andersen 1990; Friedman 1997). In this section, we reflect briefly on the current orientations in HCI from multi-, trans-, and intercultural perspectives (Yetim 1998). These concepts have different assumptions, values, and goals, and may have different consequences for research and design practice in HCI.

Though not made explicit, culture was a factor in HCI research from its very beginnings; most research considered users in the USA and designed systems from 'their' cultural perspectives. This kind of research and design effort can be characterized as *transculturally* oriented since they include a single cultural perspective or a design value such as efficiency, even though the products are to be used in several cultural contexts. Although transcultural design orientations have not disappeared, the critiques of such design efforts and the growing awareness of value differences have led to more value sensitivity among HCI researchers and practitioners.

As a consequence, many research efforts focused on the culture-design relationships from different perspectives (e.g., Gobbin 1998; Choong & Salvendy 1999; Marcus 2001; Onibere et al. 2001; Smith & Yetim 2004). They are either interested in understanding the impact of a specific design on a culture and studying its use in one or several cultural contexts, or in understanding the impact of a culture on a specific design and analyzing designs (e.g. websites) from several cultures to identify the influence of cultural values. Many of these research efforts either contribute to the empirical understanding of the interaction of culture and technology or create culture-specific artifacts. As they (often implicitly) value diversity and design artifacts that conform to specific values without paying much attention to the interaction among cultures, they can be labeled as *multiculturally* oriented.[1]

Conversely, *interculturall*y oriented research accentuates dialog and mutual understanding and considers cultural change, mutual learning and acculturation. Whereas interculturally oriented empirical research focuses on the understanding of the "togetherness" (or interaction) of cultures, interculturally oriented design orientation creates a space for their togetherness by primarily seeking shared conventions in a design process and anticipating possible breakdowns because of differences. A few works in HCI focus on the shared interfaces and allow negotiations towards a common ground (e.g., Bourges-Waldegg & Scrivener 1998; Arias et al. 2000).

As these three orientations often implicitly provide justifications for why something should be the case or should be changed, they guide research and design activity in global contexts in different ways. They either value diversity and aim at designing for diversity, or evade challenges of diversity and strive to bridge diversity. Empirical studies on cultural issues provide the knowledge and thus the preconditions for the design of interaction systems. However, it is not a new insight that empirical understanding alone is not an adequate justification for the orientation of the designer in both local and global contexts. From a design science perspective, design activities are not merely bound up in tradition and culture, they are concurrently oriented to the future and anticipate new forms of coexistence (Winograd & Flores 1986; Simon 1996). Thus, socially-compatible structuring orientations require reflection on maintaining versus restructuring, i.e., on whether that which is can continue to exist or ought to be altered (Habermas 1993). Moreover, one-sided understanding clearly does not suffice to structure interactions between diverse groups in a society; rather, there is a need for mutual understanding. Thus, we advocate an approach that values deliberative practice (Klein & Hirscheim 2001; Arias et al. 2001) in local as well as global contexts and supports informed discourse about design issues in all three design orientations discussed above. We assume that dialogs in general may lead to crossing of boundaries between subjects and create something new which goes beyond the

[1] Cultural contacts are implicitly regarded as taken place between (more individualistic) "Western Cultures" as producers of information systems with the others (mostly collectivist and high power distance cultures) as users of these products.

previous orientations and facilitates shared praxis. This applies particularly to usability guidelines that provide recommendations on creating interfaces in local and global contexts.

3 A MODEL FOR DELIBERATIVE PRACTICE IN HCI

Figure 1 presents a discourse-based model for reflection (Yetim 2005 & 2006). Within this model, two levels are distinguished: the conversation for clarification level and the discourse level. At the conversation for clarification level, we use the extended version of Ulrich's (2001) *philosophical staircase* for reflective practice. Ulrich has proposed this staircase as support for researchers and practitioners in the process of identifying and scrutinizing the diverse issues they face in any information systems development project. We have extended the staircase by two additional steps (physical clarity and aesthetic rationality) and added a set of discourses proposed by Habermas (1984 & 1993 & 1996). Whereas the staircase organizes diverse issues and provides a structure for conversations on them, the discourse level is used for argumentative examination of controversial positions which may arise during conversations. Depending on the type of controversy, different discourses are entered. Consult (Yetim 2006) for a fuller description and for the rationale of the model.

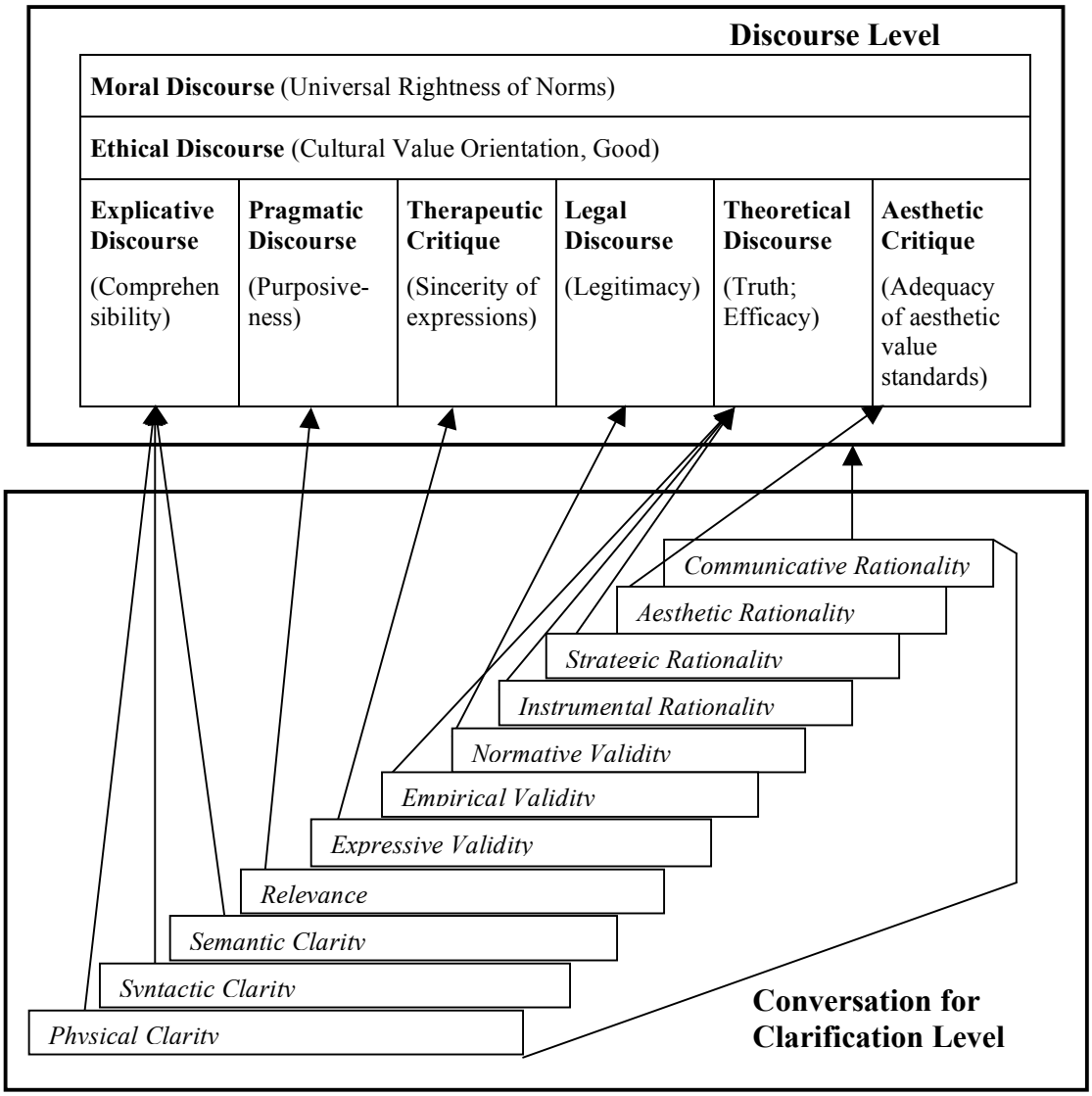

Figure 1. A model for reflection

Within the context of (universal) usability research, the model provides a structure for reflection on and discursive evaluation of many design issues in local and global contexts. It can support informed discourses among all stakeholders to legitimize design choices when designing for shared contexts. The model can be used in the following ways: Firstly, the steps of the staircase can be regarded as usability issues and communication breakdowns that need to be reflected on. They range from media-related technical issues through to syntactic, semantic, and relevance aspects of the communication content to its validity, appropriateness, and effectiveness in an interaction situation. While reflecting on these issues, possible disagreements can be resolved in related discourses, in which participants justify their positions with arguments. On the top step of the staircase (i.e. the communicative rationality), participants can reflect on what they have achieved so far in their conversations for clarification and where open issues remain to be resolved in order to achieve mutual understanding.

Secondly, the model can also be used to organize usability guidelines according to the usability issues represented by the staircase. Concurrently – when the guidelines become controversial among designers, managers, and end users due to conflicting preferences and priorities – the model provides "spaces" for conversations and discourses on the guidelines in order to validate them and/or to legitimate their applications. In what follows, we will elaborate on how the model can be used for organizing guidelines.

4 ORGANIZING USABILITY GUIDELINES

Generally, guidelines are based on design experiences or empirical research and represent recommendations or prescriptions for designing (universally) usable systems. While organizing guidelines, at least two issues are central: firstly, how can they be categorized? And secondly, what information about them is relevant and thus should be captured or represented?

Usually, guidelines are organized either around the media (text, graphics) or around the activities in the context of human computer interaction or processes of information systems development (planning, design, implementation, etc.). By contrast, our approach suggests using the staircase to organize guidelines since it represents usability categories and thus provides a set of purposes that the guidelines can serve. In other words, information and communication design guidelines are expected to recommend what should be done to provide readable/perceivable, syntactically and semantically clear signs, to communicate relevant and valid (trustworthy, reliable, appropriate) information, and to act in an efficient and effective way.

In addition to determining which guidelines belong to which categories, representing information about guidelines is another significant aspect of a deliberative approach. The issue is: how can they be best represented in order to allow reflections, negotiations, and revisions in a deliberative manner as advocated by the discourse-based model for reflection? As mentioned earlier, we conceive guidelines as recommendations or prescriptions of courses of action which are in support of a set of principles (i.e. fundamental ideals or beliefs) and specific to a particular domain such as the Web. They can be challenged and justified through argumentation, i.e. through a process of making assertions (claims) and providing support and justification for these claims from data, facts, and evidence. Thus, we regard the argument schema proposed by Toulmin (1958) as an appropriate and useful schema for the representation of relevant information about guidelines, as it differentiates between types of information and allows analysis and critique of the validity of them. Toulmin's argument schema consists of five elements: Claim, Ground, Warrant, Backing, Qualifiers, and Rebuttals. A *claim* is based on some *ground* or data. The statement that justifies the inference of the claim from the ground is called *warrant*, which itself can be *backed* by some other facts or experiences. In addition, *qualifiers* are phrases expressing the degree of certainty placed on a claim, and *rebuttals* express extraordinary or exceptional circumstances that might defeat the warranted claim.

Table 1 illustrates how this schema can be used to encapsulate knowledge on guidelines and represent them in relation to the categories of the staircase. In line with the argument schema, each category of

the staircase can be conceived of as a ground (or intended purpose) and each related guideline as a claim (or recommended action). It has the form: "IF you want to achieve X, then do Y". The knowledge of guidelines includes their justification or rationale (warrant) and supporting evidences (backing) such as empirical research or consensus among experts. In addition, optional information on the degree of strength/importance of the guidelines can indicate whether a content developer *must, should* or *can* satisfy the guideline. Finally, optional information about contextual conditions or exceptions (if any) can be represented to inform the application of guidelines (e.g. specific tasks, systems, groups or cultures).

Usability Categories ***(Intended Purposes)***	**Guidelines** ***(Recommended Actions)***	**Rationale** ***(Warrant)***	**Supporting Evidences** ***(Backing)***	**Strength & Modality** ***(Qualifier)***	**Contextual Aspects & Exceptions** ***(Rebuttals)***
Physical Clarity	1. Provide equivalent alternatives to auditory and visual content.	Since many people cannot use video, images, or sound, but they can use equivalent information provided via other media.	Web Content Accessibility Guidelines 1.0; W3C Recommendation 5-May-1999	Must	Unless the intended user groups need a specific media
	2. …	…	…	…	…
Syntactic Clarity	1. Ensure that homepage panels are of a width that will make them recognizable as panels	The width of panels seems to be critical for helping users understand the overall layout of a website.	[Much supporting research cited in (Koyani et al. 2003, p.39)]	Importance: 4 (out of 5) Strength of Evidence: 3 (out of 5)	
	2. …	…	…	…	…
Semantic Clarity	1. Identify words which may have culture-specific meanings.	Some culture-specific meanings may cause misunderstandings (e.g., the word "faculty" could be interpreted to mean "subjects", "buildings" or "academic staff members").	Kukulska-Hulme (2000)		
	2. …	…	...	...	...
Relevance	1. Explain the benefits users receive from sharing personal information.	Users will feel more inclined to provide information if the advantage of doing so is clear.	IBM Web design guidelines (www-3.ibm.com/ibm/easy/eou_ext.nsf/publish/572)		
	2. …	...	...	...	...
Expressive Validity	1. Show that there is a real organization behind your site.	This will boost the site's credibility. The easiest way to do this is by giving a physical address.	[Much supporting research cited in (Fogg 2002)]		
	2. …	…	…	…	…

Empirical Validity	1. Make it easy to verify the accuracy of the information on your site.	Web site credibility can be built by providing third-party support (citations, references, source material) for information.	[Much supporting research cited in (Fogg 2002)]		
	2. …	…	…	…	…
Normative Validity	1. Provide access to a privacy policy from every page, and highlight it whenever users give personal information .	Access to this policy helps engender trust.	IBM Web design guidelines (www-3.ibm.com/ibm/easy/eou_ext.nsf/publish/572)		
	2. …	…	…	…	…
Instrumental Rationality	1. Avoid requiring users to scroll to determine page contents.	Users should be able to recognize immediately whether the subject of any given page interests them.	IBM Web design guidelines (www-3.ibm.com/ibm/easy/eou_ext.nsf/publish/572)		
	2. ...	...	...	...	...
Strategic Rationality	1. Provide different site paths to facilitate different shopping strategies.	Sites that accommodate their users' strategies are more likely to succeed than those that force users to learn new strategies.	IBM Web design guidelines (www-3.ibm.com/ibm/easy/eou_ext.nsf/publish/572)		
	2. …	...	...	...	...
Aesthetic Rationality	1. Design in a style that will appeal to your audience's tastes.	People may prefer different styles (e.g., a reference site for a general corporate will need to convey a different image than a site which should appeal to restaurant managers and hobbyist connoisseurs interested in exotic fruit).	IBM Web design guidelines (www-3.ibm.com/ibm/easy/eou_ext.nsf/publish/572)		
	2. …	…	…	…	…

Table 1. An illustrative example for organizing guidelines

For illustration purposes, we have chosen those examples that strongly represent the intentions of the categories. In the next section, we will provide additional thoughts and lessons learned from our attempt to organize a set of research-based guidelines. At this point, we should also note that we have not considered *communicative rationality* as a category for representing guidelines. This concept refers to the achievement of mutual understanding among actors through communication. Thus, this step of the staircase can be used by participants to reflect on what they have achieved so far when discussing the guidelines step by step (Ulrich 2001). Each of the other steps provides not only

orientation for categorizing guidelines, but can also serve as a space for conversations on the related guidelines.

5 AN EXPLORATIVE STUDY AND LESSONS LEARNED

To explore the usability of the proposed approach itself, the author has experimented with a set of research-based web design and usability guidelines. The purpose of this study was to gain some insight on the applicability of the categories, at least from the author's own perspective, and also to clarify potential problems.

In this study, a collection of 187 research-based guidelines has been used, originally documented in Koyani et al (2003). They were developed by the Communication Technology Branch of the National Cancer Institute in the USA to provide clear information in an efficient and effective manner to cancer patients, health professionals, researchers, and the public. The guidelines aim to help those involved in the creation of information-oriented websites to base their decisions on the current and best available evidence. Primary audience for the guidelines are website designers, usability specialists, managers, and others involved in the creation or maintenance of websites. A secondary audience is researchers investigating Web design issues. In contrast to many currently available guidelines, these guidelines provide evidence to support them as well as information about the relative importance of individual guidelines. In Koyani et al. (2003), the guidelines are grouped according to Web design issues, which are: (1) Design process and evaluation; (2) Optimizing the user experience; (3) Accessibility; (4) Hardware and software; (5) The Homepage; (6) Page layout; (7) Navigation; (8) Scrolling and paging; (9) Headings, titles, and labels; (10) Links; (11) Text appearance; (12) Lists; (13) Screen-based controls (Widgets); (14) Graphics, image, and multimedia; (15) Writing web content; (16) Content organization; (17) Search.

We used the steps of the staircase to re-categorize the guidelines. The guidelines and the related categories can be found in the appendix. While assigning guidelines to the categories, the guiding questions have been: "What purpose(s) does this guideline serve?" or "What type of breakdowns might occur if we did not follow the corresponding guideline?" In order to decide what purpose(s) the guidelines can best serve, additional information and comments on guidelines were considered, provided by Koyani et al (2003). The author of the present paper developed a worksheet to record any problems. In the second round, they are clarified by looking again in the description of the guidelines.

The following insights concerning the process and the results should be noted. Firstly, many guidelines could be associated with more than one category. This is not surprising since – depending on the context – a guideline can serve several purposes. For example, guidelines for creating visual elements and layouts can serve both the purpose of *physical clarity* since they facilitate reading and perception of the signs, and the purpose of *aesthetic rationality* since they also influence the aesthetic appearance of the signs. By looking at explanations and evidences, one might decide to assign a guideline to one or the other category, or to both. Existing approaches to classification of guidelines restrict each guideline to only one category. In our view, this is a limitation since it may inhibit the complex nature of the guidelines. By contrast, we assigned guidelines to multiple categories by considering only the most appropriate ones.

Secondly, we did not exclude guidelines about pure system design, hardware, development methods or processes and those which have no direct link to human aspects. Our results show that many categories of our model can also be used to organize those guidelines, as the purposes of such guidelines can also be evaluated according to whether they contribute to aspects of comprehensibility, relevance and validity as well as rationality. This suggests that this approach can be meaningfully used for managing guidelines on each aspect separately as well, and this may ensure that explicit attention is paid to the usability concerns at each stage of the system development. In addition, the separation of guidelines that require specific knowledge (e.g., those related to hardware) from those that concern user's preferences might help to make the participation of end users less difficult.

Thirdly, we recognized that it is not always easy to distinguish between "instrumental rationality" and "strategic rationality" by considering the recommended actions. Whereas the former refers to the choice of the most effective means or the effective planning of the application of means for a given purpose, the latter is a purposive, but also a social, concept of rationality (Habermas 1984). Its validity is determined from its effectiveness in influencing others for achieving a given purpose. Since many guidelines are related to human aspects, we have looked whether any human cognitive aspect or any kind of user preferences are explicitly mentioned in the description of the guidelines, in order to assign it to the strategic rather than to the instrumental rationality.

Finally, the results provided in the appendix also show that the category of *instrumental rationality* contains the largest number of assigned guidelines, followed by *semantic clarity* and *strategic rationality*. This might be explained by the fact that the guidelines we have studied dealt with Web design issues, including navigation and design processes. Even so, it was surprising that no guideline could be assigned to *expressive validity,* which strongly relates to the trustworthiness and credibility aspects of Web contents. On the other hand, by using "Stanford credibility guidelines" (Fogg 2002), we could assign many guidelines to this category (see also the example in Table 1). Therefore, we do not question the distinctiveness of this category and ascribe this result to the fact that those guidelines that express credibility and trustworthiness were not included in the set of guidelines that we have used in this study.

6 DISCUSSION AND CONCLUSIONS

This paper argued that organizing and applying usability guidelines needs to support processes of deliberation and tradeoff for shared interaction contexts. It suggested a deliberative approach to dealing with some of the challenges in a rational way. Using concepts from Habermas's Discourse Theory and Toulmin's model of argumentation, the paper contributes to HCI literature by providing a theory-based management of and deliberation on usability issues and related guidelines.

Usually, guidelines are organized around the media or around the processes of information system development. Some approaches take theories of human computer interaction as a guide (Norman 1990) and consider several stages of user activities involved in a user's performance of a task. We do not question the usefulness of such approaches in practice. However, we argue that there are issues of comprehensibility, validity and rationality at each stage of the development and activity and that their justifications and negotiations need to be differentiated according to the logic of issue as advocated by the discourse theory. As mentioned above, the proposed model can also be used separately in different information system development activities such as planning, design, and implementation. In addition the model can be adapted to different contexts. For example, it may represent only guidelines related to localization issues (i.e. multicultural perspectives) or to that of internationalization of interfaces (i.e., intercultural perspectives for designing shared interfaces), as well as to domain-specific guidelines such as virtual communities or web contents.

When using the discourse-based model for discussion, conversations on guidelines can take place while assigning them to the categories since each guideline itself can be collaboratively evaluated according to its comprehensibility, relevance, validity and rationality aspects. This kind of reflective conversation may be called ex ante meta-communication (Yetim 2005). Conversations on guidelines can also take place during their use in application contexts (in the sense of meta-communication-in-action). In such situations, the relevance or appropriateness of the guidelines can be re-assessed. Finally, reflective conversations on guidelines can also take place indirectly, for example, when end users provide further critique and feedback on a system's features at use time (in the sense of ex post meta-communication). This kind of conversation may also contribute to the improvement or rejection of guidelines or their applications.

While discussing guidelines, actors enter discourses and provide arguments if they have at least two competing positions. The final decisions can, for example, be achieved through voting, which may

provide the strength of evidence for the relevance of the guidelines in a given context. The categories can serve as a memory and can also be linked to further published literature on the related issue. Through the link from the staircase to the discourses, reading the context-driven discussion and controversial positions on particular usability suggestion can be easily identified.

Regarding the implications of the approach, researchers may invest more in the usability of the discourse-based model in collaborative online environment. The study provides a set of purpose categories, which may guide future studies such as re-evaluation of guidelines according to their evidence for supporting these specific purposes. One of the limitations of this study is that it considers only the author's own perspective in the classification of guidelines. Thus, additional experiments with larger groups would provide useful insights on the usability of the classification concepts.

Practitioners should also implement a clear process of participation for the review of guidelines as well as for conversations during their applications. As Schneiderman (2003) remarks, to make a guidelines process effective, participants will have to be motivated to read it, think about it, discuss it - even complain about it. In addition, creative designers may produce innovative, compelling designs that were not anticipated by the guidelines writers. Organizations should produce an annual revision that improves the guidelines and extends them to cover novel topics, creative works as well as local needs (e.g., local policy, legal issues).

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References

Ackerman, M. (2002). The Intellectual Challenge of CSCW: The Gap Between Social Requirements and Technical Feasibility. *Human-Computer Interaction* 15 (2002), 179-203

Arias, E.; Eden, H.; Fischer, G.; Gorman, A. and Scharff, E. (2000). Transcending the individual human mind—creating shared understanding through collaborative design, *ACM transactions on Human Computer interaction* 7(1) (2000), 84-113.

Bourges-Waldegg, P. and Scrivener, S.A.R. (1998). Meaning, the central issue in cross-cultural HCI design. *Interacting with Computers* 9 (3) (1998), 287-309.

Brown, J.S. and Duguid, P. (1994). Borderline Issues: Social and Material Aspects of Design. *Human-Computer Interaction* 1 (1994), 3-36.

Choong, Y. and Salvendy, G. (1999). Implications for Design of Computer Interfaces for Chinese Users in Mainland China. *International Journal of Human-Computer Interaction* 11 (1999), 29-46.

Fogg, B.J. (2002). "Stanford Guidelines for Web Credibility." A Research Summary from the Stanford Persuasive Technology Lab. Stanford University. www.webcredibility.org/guidelines

Friedman, B. (1997)(Ed.). *Human Values and the Design of Computer Technology*. Cambridge University Press, New York NY.

Gobbin, R. (1998). The role of cultural fitness in user resistance to information technology tools. *Interacting with Computers* 9 (1998), 275-285

Habermas, J. (1996). *Between Facts and Norms*. Cambridge, MA, MIT Press.

Habermas, J. (1993). *Justification and Application*. Cambridge, MA, MIT Press.

Habermas, J. (1984). *The Theory of Communicative Action: Reason and the Rationalization of Society*. Boston, MA, Beacon Press. (Vol. I)

Hirschheim, R.; Klein H.K. and Lyytinen, K. (1996). Exploring the intellectual foundations of information systems. *Accounting , Management and Information Technologies* 6 (1996), 1-64

Klein, H. and Hirschheim, R. (2001). Choosing Between Competing Design Ideals in Information Systems Development. *Information Systems Frontiers* 2 (2001), 75-90

Koyani, S.J.; Balley, R.W.; Nall, J.R.; Allison, S.; Mulligan, C.; Bailey, K. and Tolson, M. (2003). Research-Based Web Design & Usability Guidelines. NIH Publication NO. 03-5424

Kukulska-Hulme, A (2000). Communication with users: insight from second language acquisition. *Interacting with Computers* 12 (2000), 587-599.

Kumar, K. and Bjorn-Andersen, N. (1990). A cross-cultural comparison of IS designer values. *Communications of the ACM* 33(5) (1990), 528-538.

Marcus, A. (2001). International and Intercultural User Interfaces. In: Stephanidis, C. (ed.): User Interfaces for All. Concepts, Methods, and Tools. London: Lawrence Erlbaum, 47-63.

Muller, M.J. (2001). Layered Participatory Analysis: New Developments in the CARD technique. In: *Proceeding of CHI'01*, Seattle, WA, 90-97.

Norman, D. A. (1990). *The Design of Everyday Things.* Doubleday: New York, New York.

Onibere, E.A.; Morgan, S.; Busang, E.M. and Mpoeleng, D. (2001). Human-computer interface design issues for a multi-cultural and multi-lingual English speaking country – Botswana. *Interacting with computers* 13 (2001), 497-512.

Schneiderman, B. (2003). Forward to "Research-Based Web Design & Usability Guidelines". In: Koyani et al (2003).

Schneiderman, B. (2000). Universal Usability. *Communications of the ACM* 5(2000), 84-91.

Simon, H. (1996). *The Sciences of the Artificial*, 3rd edition. Cambridge, Mass., and London: MIT Press.

Smith, A. and Yetim, F. (2004)(eds.). Special Issue: Global Human Computer Systems: Cultural Determinants of Usability. *Interacting with Computers* 1(2004).

Toulmin, S. (1958). *The Uses of Argument*. Cambridge University Press, Cambridge.

Ulrich, W. (2001). A Philosophical Staircase for Information Systems Definition, Design and Development. *Journal of Information Technology Theory and Application* 3 (2001), 55-84.

Winograd, T. and Flores, F. (1986). *Understanding Computers and Cognition; a New Foundation for Design.* Norwood, NJ: Ablex Publishing.

Yetim, F. (2006). Acting with Genres: Discursive-Ethical Concepts for Reflecting on and Legitimating Genres. *European Journal of Information Systems* 15 (1) (2006), 54-69.

Yetim, F. (2005). A Discourse-Based Meta-Communication Model for Collective Sense Making. *Proceedings of the 10th Int. Conference on the Language-Action Perspective on Communication Modelling (LAP 2005),* Kiruna, Sweden, Sept. 19-20, 2005.

Yetim, F. (1998). Interkulturalität und Informatische Gestaltung – Eine Interdisziplinäre Annäherung. *Informatik-Spektrum* 21 (1998), 203-212.

Zhang, P.; Li, N. (2005). The Intellectual Development of Human-Computer Interaction Research: A Critical Assessment of the MIS Literature (1990 – 2002). *Journal of the Association for information Systems* 6 (2005), 227-291.

APPENDIX. A SET OF GUIDELINES AND THEIR RELATION TO CATEGORIES

Guidelines from Koyani et al (2003) ***Note*** *that the guidelines are expressed by short titles. The longer descriptions along with the associated comments provided the basis for categorizing them.*	**Related Categories** ***Note*** *that the first category is viewed as the most appropriate one.*
1. Design Process and Evaluation	
1.1 Set and State Goals	Relevance, Instrumental Rationality
1.2 Use an Iterative Design Approach	Instrumental Rationality
1.3 Evaluate Websites Before and After Making Changes	Instrumental Rationality
1.4 Provide Useful Content	Relevance
1.5 Understand and Meet Users Expectations	Relevance
1.6 Establish User Requirements	Relevance, Strategic Rationality
1.7 Use Parallel Design	Instrumental Rationality
1.8 Consider Many User Interface Issues	Relevance, Strategic Rationality
1.9 Focus on Performance Before Preference	Relevance, Instrumental Rationality
1.10 Set Usability Goals	Relevance, Instrumental Rationality
1.11 Select the Right Number of Participants	Relevance, Instrumental Rationality
1.12 Be Easily Found on the Web	Relevance, Strategic Rationality
1.13 Recognize Tester Bias	Empirical Validity
1.14 Use Heuristics Cautiously	Empirical Validity
1.15 Use Cognitive Walkthroughs Cautiously	Empirical Validity
1.16 Apply Automatic Evaluation Methods	Instrumental Rationality, Empirical Validity
2. Optimizing the User Experience	
2.1 Display Information in a Directly Usable Format	Instrumental Rationality, Syntactic Clarity
2.2 Do not Display Unsolicited Windows or Graphics	Instrumental Rationality
2.3 Provide Assistance to Users	Strategic Rationality
2.4 Provide Printing Options	Instrumental Rationality
2.5 Standardize Task Sequences	Instrumental Rationality
2.6 Minimize Page Download Time	Instrumental Rationality
2.7 Warn of Times Outs	Strategic Rationality, Normative Validity
2.8 Reduce the Users Workload	Strategic Rationality
2.9 Use Users Terminology in Help Documentation	Strategic Rationality, Semantic Clarity
2.10 Provide Feedback When Users Must Wait	Strategic Rationality
2.11 Inform Users of Long Download Times	Strategic Rationality
2.12 Do not Require Users to Multitask While Reading	Strategic Rationality, Normative Validity
2.13 Design for Working Memory Limitations	Instrumental Rationality
2.14 Develop Pages that Will Print Properly	Instrumental Rationality, Physical Clarity
3. Accessibility	
3.1 Comply with Section 508	Normative Validity
3.2 Design Forms for Users Using Assistive Technology	Strategic Rationality
3.3 Provide Text Equivalents for Non-Text Elements	Physical Clarity, Instrumental Rationality
3.4 Do Not Use Color Alone to Convey Information	Physical Clarity
3.5 Provide Equivalent Pages	Physical Clarity
3.6 Ensure that Scripts Allow Accessibility	Physical Clarity
3.7 Provide Client-Side Image Maps	Physical Clarity
3.8 Enable Users to Skip Repetitive Navigation Links	Instrumental Rationality
3.9 Provide Frame Titles	Semantic Clarity
3.10 Test Plug-ins and Applets for Accessibility	Semantic Clarity, Instrumental Rationality
3.11 Synchronize Multimedia Elements	Syntactic Clarity, Instrumental Rationality
3.14 Do Not Require Style Sheets	Physical Clarity, Normative Validity
3.15 Avoid Screen Flicker	Physical Clarity
4. Hardware and Software	
4.1 Design for Common Browsers	Physical Clarity
4.2 Account for Browsers Differences	Physical Clarity
4.3 Design for Popular Operating Systems	Physical Clarity
4.4 Design for User's Typical Connection Speed	Physical Clarity
4.5 Design for Commonly Used Screen Resolution	Physical Clarity
5. The Homepage	

5.1 Create a Positive First Impression of Your Site	Strategic Rationality
5.2 Ensure the Homepage Looks like a Homepage	Semantic Clarity
5.3 Show All Major Options on the Homepage	Relevance
5.4 Enable Access to the Homepage	Instrumental Rationality
5.5 Attend to Homepage Panel Width	Syntactic Clarity
5.6 Announce Changes to a Website	Relevance, Strategic Rationality
5.7 Communicate the Website's Purpose	Relevance, Strategic Rationality
5.8 Limit Prose Text on the Homepage	Relevance, Strategic Rationality
5.9 Limit Homepage Length	Relevance, Strategic Rationality
6. Page Layout	
6.1 Set Appropriate Page Lengths	Instrumental Rationality
6.2 Use Frame When Functions Must Remain Accessible	Instrumental Rationality
6.3 Establish Level of Importance	Relevance
6.4 Place Important Items at Top Center	Strategic Rationality, Relevance
6.5 Place Important Items Consistently	Strategic Rationality
6.6 Structure for Easy Comparison	Instrumental Rationality
6.7 Use Moderate White Space	Instrumental Rationality
6.8 Align Items on a Page	Syntactic Clarity, Aesthetic Rationality
6.9 Choose Appropriate Line Lengths	Instrumental Rationality
6.10 Avoid Scroll Stoppers	Semantic Clarity
7. Navigation	
7.1 Provide Feedback on Users Location	Instrumental Rationality
7.2 Use a Clickable List of Contents on Long Pages	Instrumental Rationality, Relevance
7.3 Do Not Create Pages with No Navigational Options	Instrumental Rationality
7.4 Differentiate and Group Navigation Elements	Semantic Clarity
7.5 Use Descriptive Tab Labels	Semantic Clarity
7.6 Present Tabs Effectively	Semantic Clarity
7.7 Use Site Maps	Instrumental Rationality
7.8 Use Appropriate Menu Types	Instrumental Rationality, Syntactic Clarity
7.9 Keep Navigation – only Pages Short	Instrumental Rationality
7.10 Use Glosses to Assist Navigation	Relevance, Strategic Rationality
8. Scrolling and Paging	
8.1 Eliminate Horizontal Scrolling	Instrumental Rationality
8.2 Use Scrolling Pages for Reading Comprehension	Strategic Rationality
8.3 Use Paging Rather Than Scrolling	Instrumental Rationality
8.4 Scroll Fewer Screenfuls	Instrumental Rationality
8.5 Facilitate Rapid Scrolling	Strategic Rationality
9. Headings, Titles, and Labels	
9.1 Use Clear Category Label	Semantic Clarity
9.2 Use Unique and Descriptive Headings	Semantic Clarity
9.3 Use Descriptive Row and Column Headings	Semantic Clarity
9.4 Use Descriptive Headings Liberally	Strategic Rationality
9.5 Provide Descriptive Page Titles	Semantic Clarity
9.6 Highlight Critical Data	Relevance, Strategic Rationality
9.7 Provide Users with Good Ways to Reduce Options	Instrumental Rationality
9.8 Use Headings in the Appropriate HTML Order	Syntactic Clarity, Semantic Clarity
10. Links	
10.1 Provide Consistent Clickability Cues	Semantic Clarity
10.2 Avoid Misleading Cues to Click	Semantic Clarity
10.3 Use Text for Links	Semantic Clarity
10.4 Use Meaningful Link Labels	Semantic Clarity
10.5 Match Link Names with Their Destination Pages	Semantic Clarity, Syntactic Clarity
10.6 Ensure that Embedded Links are Descriptive	Semantic Clarity, Syntactic Clarity
10.7 Repeat Important Links	Relevance, Strategic Rationality
10.8 Designate Used Links	Instrumental Rationality
10.9 Link to Related Content	Relevance, Instrumental Rationality
10.10 Link to Supportive Information	Empirical Validity, Relevance
10.11 Use Appropriate Text Link Lengths	Normative Validity, Semantic Clarity
10.12 Indicate Internal vs. External Links	Instrumental Rationality
10.13 Use Pointing – and – Clicking	Instrumental Rationality
10.14 Clarify Clickable Regions of Images	Semantic Clarity, Instrumental Rationality

11. Text Appearance	
11.1 Use Black Text on Plain, High-contrast Backgrounds	Physical Clarity
11.2 Ensure Visual Consistency	Aesthetic Rationality
11.3 Format Common Items Consistently	Syntactic Clarity
11.4 Use at Least 12-Point Font	Physical Clarity
11.5 Use Familiar Fonts	Strategic Rationality
11.6 Emphasize Importance	Relevance
11.7 Use Attention-Attracting Features when Appropriate	Relevance, Strategic Rationality
12. Lists	
12.1 Order Elements to Maximize User Performance	Instrumental Rationality
12.2 Display Related Items in Lists	Relevance
12.3 Introduce Each List	Semantic Clarity
12.4 Format Lists to Ease Scanning	Physical Clarity
12.5 Start Numbered Items at one	Syntactic Clarity
12.6 Place Important Items at Top of the List	Strategic Rationality, Relevance
12.7 Capitalize First Letter of First Word in Lists	Syntactic Clarity
12.8 Use Appropriate List Style	Syntactic Clarity
13. Screen-based Controls (Widgets)	
13.1 Distinguish Required and Optional Data Entry Fields	Normative Validity
13.2 Detect Errors Automatically	Empirical Validity
13.3 Minimize User Data Entry	Instrumental Rationality
13.4 Label Data Entry Fields Clearly	Semantic Clarity
13.5 Put Labels Close to Data Entry Fields	Semantic Clarity
13.6 Label Pushbuttons Clearly	Semantic Clarity
13.7 Label data Entry Fields Consistently	Semantic Clarity
13.8 Allow Users to See Their Entered Data	Physical Clarity, Instrumental Rationality
13.9 Display Default Values	Relevance, Instrumental Rationality
13.10 Use a Minimum of Two Radio Buttons	Instrumental Rationality
13.11 Use Radio Buttons for Mutually Exclusive Selections	Instrumental Rationality
13.12 Use Check Boxes to Enable Multiple Selections	Instrumental Rationality
13.13 Use Familiar Widgets	Strategic Rationality, Relevance
13.14 Use a Single Data Entry Method	Instrumental Rationality
13.15 Partition Long Data Items	Syntactic Clarity
13.16 Do not Make User-Entered Codes Case Sensitive	Syntactic Clarity
13.17 Place Cursor in First Data Entry Field	Instrumental Rationality
13.18 Provide Auto-tabbing Functionality	Instrumental Rationality
13.19 Label Units of Measurement	Semantic Clarity
13.20 Ensure that Double-Clicking Will Not Cause Problems	Syntactic Clarity, Instrumental Rationality
13.21 Do Not Limit Viewable List Box Options	Instrumental Rationality
13.22 Use Open Lists to Select One from Many	Instrumental Rationality
13.23 Prioritize Pushbuttons	Relevance, Strategic Rationality
13.24 Minimize Use of the Shift key	Instrumental Rationality
13.25 Use Data Entry Fields to Speed Performance	Instrumental Rationality
14. Graphics, Images, and Multimedia	
14.1 Use Video, Animation, and Audio Meaningfully	Relevance
14.2 Include Logos	Instrumental Rationality
14.3 Limit Large Images Above the Fold	Instrumental Rationality
14.4 Limit the Use of Images	Relevance, Instrumental Rationality
14.5 Label Clickable Images	Semantic Clarity
14.6 Ensure that Images Do Not Slow Downloads	Instrumental Rationality
14.7 Use Thumbnail Images to Preview Larger Images	Instrumental Rationality
14.8 Graphics Should Not Look Like Banner Ads	Strategic Rationality, Semantic Clarity
14.9 Use Simple Background Images	Aesthetic Rationality, Physical Clarity
14.10 Include Actual Data with Data Graphics	Semantic Clarity, Strategic Rationality
14.11 Display Monitoring Information Graphically	Semantic Clarity
14.12 Introduce Animation	Strategic Rationality, Semantic Clarity
14.13 Ensure Website Images Convey Intended Messages	Relevance, Strategic Rationality
14.14 Use Images to Facilitate Learning	Strategic Rationality
14.15 Emulate Real-World Objects	Semantic Clarity, Empirical Validity
15. Writing Web Content	
15.1 Define Acronyms and Abbreviations	Semantic Clarity

15.2 Use Abbreviations Sparingly	Semantic Clarity
15.3 Use Familiar Words	Relevance, Semantic Clarity
15.4 Use Mixed Case with Prose	Instrumental Rationality
15.5 Avoid Jargon	Semantic Clarity
15.6 Make First Sentences Descriptive	Strategic Rationality
15.7 Use Active Voice	Strategic Rationality
15.8 Write Instructions in the Affirmative	Strategic Rationality
15.9 Limit the Number of Words and Sentences	Instrumental Rationality
15.10 Limit Prose Text on Navigation Pages	Instrumental Rationality
15.11 Make Action Sequences Clear	Instrumental Rationality, Syntactic Clarity
16. Content Organization	
16.1 Organize Information Clearly	Instrumental Rationality
16.2 Put Critical Information Near the Top of the Website	Instrumental Rationality
16.3 Facilitate Scanning	Instrumental Rationality
16.4 Group Related Elements	Instrumental Rationality
16.5 Display Only Necessary Information	Strategic Rationality, Relevance
16.6 Ensure that Necessary Information is Displayed	Strategic Rationality, Relevance
16.7 Format Information for Multiple Audiences	Strategic Rationality
16.8 Design Quantitative Content for Quick Understanding	Instrumental Rationality
16.9 Use Color for Grouping	Instrumental Rationality, Semantic Clarity
17. Search	
17.1 Provide a Search Options on Each Page	Instrumental Rationality
17.2 Ensure Usable Search Results	Strategic Rationality, Relevance
17.3 Allow Simple Searches	Instrumental Rationality
17.4 Make Upper-and Lowercase Search Terms Equivalent	Instrumental Rationality
17.5 Design Search Engines to Search the Entire Site	Instrumental Rationality
17.6 Design Search Around Users Terms	Strategic Rationality, Relevance
17.7 Notify Users When Multiple Search Options Exist	Strategic Rationality, Relevance
17.8 Provide Search Templates	Instrumental Rationality