

- ◆ Describes the role of heuristics in the Web design and evaluation processes
- ◆ Explains how the heuristics in this issue were developed

Developing Heuristics for Web Communication: An Introduction to This Special Issue

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In only a few years' time, the World Wide Web has grown from a curiosity into a standard communication medium. Since its conception in 1990 and the first prototype in 1991, the Web has come into general use at an amazing pace. Current estimates are that 35 percent of the adult population in the U.S. has access to the Internet; 20–30 percent of the people in other English-speaking countries, Scandinavia, and the Netherlands; and 10–15 percent of the German- and Japanese-speaking people (Global Reach 2000). And 90 percent of those with Internet access find the World Wide Web indispensable (GVU 1998).

Compared with the situation a few years ago, simply having a Web presence no longer guarantees that an organization's site will attract visitors. The mesmerizing effect of the new technology and the new tricks is wearing off. The multitude of available Web sites decreases the chances of reaching the intended audiences and of achieving the intended communicative effects. Thus, organizations are becoming aware that their Web presence should no longer be the responsibility of only their computer people but should instead be treated as an essential and integrated part of their internal and external communication policy. The Web site and the communication policy it embodies are therefore increasingly the responsibility of communication managers and designers.

But what kinds of questions should communication managers and designers ask themselves when they embark on Web site design? A glance at the shelves of a well-stocked bookstore shows a range of books on technical aspects of Web site design and a handful of books on graphic design, but an approach to Web site design from a comprehensive communication perspective is missing.

While designers of communication in traditional print can base their decisions on a rich variety of sources that tell “what works” and “what doesn't,” such evidence is not available when it comes to designing Web sites. Nevertheless, millions of Web pages and Web sites must be designed *now*, and their designers and developers cannot wait until all their questions are answered by extensive and thorough empirical research. They need some sense of what is currently known so that they can exercise informed design judgment.

NEED FOR COMMUNICATION-ORIENTED HEURISTICS

This special issue of *Technical communication* reflects our attempts to develop instruments—that is, five sets of heuristics—that will help designers and developers of Web pages or sites to consider crucial communicative aspects of Web site design.

The word *heuristic* comes from the Greek word for “discovering.” Heuristics are procedures or principles that help their users work systematically toward a discovery, a decision, or a solution. Heuristics are typically used in situations where there is more than one good answer, more than one solution. They increase the chance that the solution chosen is the best possible solution among the many solutions possible. The Greek rhetoricians, for example, used heuristics to “discover” what to say in their speeches.

In this issue, we consider the process of designing and producing communication as a process in which communicators work systematically toward the best possible so-

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lution to a particular communication problem. The procedures and principles that communicators apply in the process, sometimes deliberately but often implicitly, can be considered heuristics. Heuristics can be process-oriented or product-oriented. When they are process-oriented, they suggest procedures and activities that increase the chance that the result of the process is the best possible result. When they are product-oriented, they are collections of principles that either support decision-making about product features early in the design process, or help to evaluate a draft, prototype, or product. Although the dictionary meaning of *heuristic* is broader, the everyday meaning of the term *heuristics* has come to be “sets of questions, principles, or product guidelines.” In that sense, communicators use heuristics all the time, although they may not be aware of it.

The term *heuristic* often appears in the combination *heuristic evaluation*, a term coined by Nielsen (1994). In the heuristic evaluation procedure, originally developed for the evaluation of software user interfaces, evaluators inspect the interface or a design prototype of the interface, guided by a list of principles—the heuristics—that help them to discover design violations and flaws. The difference between heuristics and other forms of expert or usability review is that the heuristics that experts apply when they evaluate an interface are made explicit. Nielsen’s idea was that by making the principles explicit, non-expert evaluators could be trained to recognize violations of the principles. Findings about the effectiveness of heuristic evaluation compared with other forms of evaluation are mixed (for a discussion of this topic, see de Jong and van der Geest’s contribution to this issue).

We see a need for communication-oriented heuristics for the Web. We believe that they can be very helpful tools for designers and evaluators of communication products, particularly in a field where practitioners may be unaware of a comprehensive and tested knowledge base about what works in communication. Such heuristics can serve to focus and at the same time broaden the reviewers’ insights into the communicative strengths and weaknesses of design proposals or prototypes in various stages. When applied by designers and developers at appropriate stages in the Web site development process, they can increase the chance of developing a Web site that is not merely technically sound

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but also effective in terms of communicative effect, intended as well as perceived, for particular audiences in particular contexts of use.

SYSTEMATIC REVIEWS, HEURISTICS, AND USER-FOCUSED TESTING

In the literature about assessing problems with the effectiveness of communication products to improve them, researchers have shown preference to reader- or user-focused testing over “expert”-focused evaluation such as reviews and heuristic evaluation (for example, Dumas and Redish 1993; Schriver 1997). Without diminishing the value of user-focused testing, we argue that careful and systematic reviews that are guided by heuristics should precede and complement user-focused testing in the design process. Review in general, and review guided by heuristics in particular, fulfills functions that user-focused testing cannot fulfill.

Functions of review

First of all, review has a function beyond detecting potential problems and pitfalls of an in-progress communication product, such as a Web site. Review cycles help designers and developers to gain commitment and buy-in from other stakeholders in the organization (Janssen and Schilperoord 1992; Kleimann 1991; van der Geest and van Gemert 1997).

Second, reviews can help the designer or developer to contemplate Web site quality early in the design process while the whole range of design options is still open for decision or before a prototype is ready for user testing (Nielsen 1993; Wixon and Ramey 1996).

Third, a careful review process by stakeholders or experts can serve to identify design options or decisions that need to be studied in more detail in user-focused evaluations.

Finally, review meetings, particularly if they are conducted by experts, can help designers and reviewers to consider aspects of Web site quality that could easily go unnoticed in usability tests. According to Conyer (1995), users can find it difficult to visualize how a product could behave differently, and hence they tend to evaluate according to what already exists rather than according to what is possible. A study by Desurvire (1994) demonstrated that users and experts in a heuristic evaluation noticed different problems. Therefore, we think that a thorough communication design process should include review cycles in which feedback from stakeholders and experts is collected, before and in addition to user-focused evaluation.

Heuristics as support for review practice

The feedback that is provided in review cycles, however, often frustrates designers and developers, and the benefits are not always clear. Designers and developers often feel

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that the comments are unfocused, contradictory, uninformative for revising the products, or lacking in credibility because the reviewers simply seem to exercise their personal biases in judging the design (van der Geest and van Gemert 1997). Review on the basis of heuristics can solve these problems. It can give the comments more substance, objectivity, and credibility. The evaluation of a plan, prototype, or site can be more systematic and less prone to influence by personal likes and dislikes. The heuristics can give reviewers a shared terminology and set of standards with which to discuss design or redesign decisions. They can give designers and reviewers access to document design expertise, helping focus attention on issues that affect the communicative quality of the Web site. This is especially important for the many designers and reviewers of Web sites who do not have a communication background.

On the basis of these considerations, we believe that the development of the communication heuristics for Web design and review reported in this issue of the journal was a worthwhile endeavor, both from an academic and a practitioner's point of view.

DEVELOPING HEURISTICS IN AN R&D PROCESS

Many of you may say that heuristics or guidelines for Web design abound, especially on the Web itself. In fact, an Internet search by de Jong and van der Geest discovered hundreds of Web heuristics. A closer look at what they address, however, reveals that their content and validity is often quite unclear. If heuristics are to serve as an instrument for designers and reviewers, these instruments surely raise many questions. In which stage of the design process should they be used, and for which aspects of the Web site or Web page? Are the guidelines or principles based on empirical research, or are they the fruit of one practitioner's experiences and preferences? Is there any evidence that using the heuristics has resulted in better problem analysis or better review practices? What makes particular heuristics more or less usable for designers or evaluators who want to apply them?

Analyzing tools of the trade

Such questions about instruments that we consider tools of the trade are so basic that we think it is time for researchers (as well as for practitioners) to address them. The questions

relate to typical methodological issues—that is, the validity and reliability of heuristics as analysis or evaluation instruments. We hope that, in the end, our work can make practitioners more aware of the limitations and possibilities of heuristics, and thus help them to select effective and valid heuristics that fit their context of use.

The article by de Jong and van der Geest in this issue presents a framework for characterizing and analyzing the broad variety of heuristics that are available for Web designers. De Jong and van der Geest want to support Web designers in their choice of tools and contribute to their professional expertise by developing a means to identify the potential value and limitations of particular heuristics. In demonstrating how to apply their framework, de Jong and van der Geest give an impression of the range of Web heuristics currently available.

Developing new heuristics

But in this issue we want to go beyond characterizing Web heuristics developed by others. We also present five newly developed sets of Web heuristics. There is a difference between the heuristics we present here and many of the heuristics that one can find elsewhere, even if they may seem to cover the same areas of interest. The heuristics presented in this issue have been developed in the course of a systematic research and development process. Before describing this process, we want to discuss the scope of our heuristics.

SCOPE OF THE WEB HEURISTICS

The heuristics presented in this issue focus on informational elements of Web sites. Although the World Wide Web was conceived of as an information transfer tool for collaborating scientists, it has grown into a medium that provides a much broader variety of communicative experiences for users than information transfer alone. The envisioned World Wide Web of information has become a channel for Internet-supported forms of trade, games, instruction, debate, chat, entertainment, news, sex, and much more. We thought it unlikely that a few sets of heuristics could adequately cover this whole variety of communicative experiences. Therefore, we focused on developing heuristics for those elements of Web sites or Web pages that primarily have an informational function.

Focus on informational Web sites

We loosely define an informational Web site element as an element in which descriptive and explanatory information dominates, as opposed to site elements in which persuasive (either sales or ideological) or entertaining information dominates, or site elements that are primarily set up for person-to-person interaction. The communication processes evoked by site or page elements that primarily have

a persuasive function (for example, banners and advertisements), an entertainment function (for example, games), or an interaction function (for example, a chat room) are so different from elements with a primarily informational function that they pose essentially different questions to designers and evaluators.

We thus deliberately exclude essential and characteristic parts of many Web sites from the focus of our heuristics, but we do include large parts of almost every Web site created so far. Almost every site contains information, presented by authors to prospective site visitors, in verbal or visual form. The heuristics presented here are meant to support the design and evaluation of information and the way it is presented. It might well be that some of our heuristics are also applicable to noninformational elements of Web sites, but we have not focused on those in developing the heuristics presented here.

Topics of the five sets of heuristics

Our heuristics cover five aspects of Web design and evaluation:

- ◆ The rhetorical situation as it is created by authors for and with their readers is the focus of the heuristics developed by Steehouder and Coney.
- ◆ Navigation as a means to signal the information structure of a site and to guide visitors to and through the information is the focus of the heuristics developed by Farkas and Farkas.
- ◆ The presentation of verbal information so that users can comprehend it is the focus of the heuristics developed by Spyridakis.
- ◆ The visual display and presentation of information is the focus of the heuristics developed by Williams.
- ◆ The involvement of users, either directly or indirectly, in the design and evaluation of Web sites is the focus of the last set of heuristics developed by Ramey.

Invitation to expand

Although the five sets of heuristics cover important aspects of Web design, we are quite aware that they are by no means all-inclusive regarding informational elements of Web sites. While working on these five sets, we kept discovering other topics that in our view deserve well-grounded and empirically tested heuristics. The try-outs that we arranged for our five sets could well be expanded with try-outs of heuristics on information quality, for which Alexander and Tate's checklist (1999) would make a good start, and heuristics on good use of search engines within and outside a site, such as the guidelines by Schweibenz (1999). There is also a need for good heuristics on audience-function relationships and on globalization/localization. However, separate sets of heuristics on these topics

were not included in our systematic research and development process and can be found here only as brief parts of some of the sets. We hope that the five sets of heuristics and the development process described in the next section encourage other heuristics developers to further our work on research-based and empirically tested tools for Web designers and evaluators.

THE R&D PROCESS

The work on the Web heuristics took place within the framework of an international research collaboration between faculty members from the Department of Technical Communication at the University of Washington (Seattle, WA) and faculty members of the Language and Communication group of the University of Twente (Enschede, the Netherlands). This collaboration has included offering a series of annual international summer workshops. The 1999 workshop focused on heuristics for assessing and enhancing the communicative qualities of Web sites. Participants for the summer workshops are graduate and undergraduate students, and faculty from communication programs around the world who are committed to research on document design and technical communication. In the 1999 workshop, participants came from Sweden, Ireland, Germany, the Netherlands, the U.S., Korea, and Japan.

The five sets of heuristics presented in this issue were developed using a four-step research and development process.

Step 1: Inventory and review of existing literature

The first step in developing the heuristics was to inventory the available knowledge about Web communication and to relate the findings of existing studies to each other. This type of literature search, in its more rigid form indicated by the term *meta-analysis*, is thornier than it might at first seem.

The literature about the Web is dispersed across a number of disciplines that all have different ways of approaching and analyzing the topic. This fact makes it difficult to arrive at a comprehensive view of what is currently known. Moreover, the Web as a presentation medium is so young that the number of empirical studies on the communicative effects of particular Web features is still very small. For many aspects of Web site design, we have to rely on sources that contain convictions, opinions, and descriptions of practice (sometimes called anecdotal evidence), rather than proof of benefit and effectiveness. Many of the studies we could find come from the domains of paper document design and interface usability research rather than from Web site usability research. At face value, we assume that knowledge about paper documents and interfaces *might* be applicable to Web sites, but to what extent the findings of those fields are applicable is unclear. For

example, if a study has identified 10 well-proven design principles for usable software interfaces, is it valid to assume that these same principles apply to Web pages too, simply because Web pages are presented on screen?

We decided that our inventory and review of the literature should not be limited to “hard proof” but should also include the so-called anecdotal evidence and analytical communication theories that open up new ways of looking at Web communication. For each of the five sets of heuristics, an inventory of the relevant literature was conducted.

Step 2: Formulating the draft heuristics

The next issue concerned how to make the existing knowledge available to Web designers and developers in a way that would be relevant to their professional practice. We did not want to consider our work finished with the typical literature review article because such a format is not a good fit as a job aid. Hence, we decided to translate findings in the literature into heuristics, that is, collections of guidelines, questions, or principles. The heuristics were summarized in “quicklists,” which could serve as job aids for designers and developers of Web sites.

We questioned what such heuristics should look like. The fact is that we still don’t know what format makes heuristics successful. There is very little information available about how practitioners actually use heuristics and thus no sound basis for instructions on how sets of heuristics should be formulated to make them easy to use on the job. Therefore, at this stage, the heuristics authors were free to choose any presentation format for the draft heuristics they thought might work for the practitioners. To determine what makes for usable heuristics, we included questions about the users’ experiences during the three-stage user review of the heuristics described in Step 3.

Step 3: Review of the draft heuristics

We wanted to develop our heuristics using an iterative development process, obtaining user feedback to guide our revisions. We wanted to know how practitioners used our heuristics and what they found out about the sites they evaluated with the heuristics. Did different heuristics bring the same communication problems to the fore, or did they help to detect specific types of problems? We were also interested in the users’ experiences in using the heuristics. Did they feel they were well geared to the task of reviewing the site? Did the heuristics cover the areas they found important? Did they find the topics within the heuristics well defined and easy to apply? Did they think that the heuristics helped them to detect flaws or problems that would otherwise have gone unnoticed?

So we needed “users of heuristics,” and we found them in the group of international communication students and faculty who attended the 1999 summer workshop and in

our network of corporate Web design professionals. They tried out the heuristics and reported back about their experiences.

The in-progress heuristics were the focus of the 1999 summer workshop in Seattle. During the week-long workshop, the authors presented their heuristics and the background literature on which they were based. Workshop participants worked in small teams and used the five sets of heuristics to review a particular Web site. After the teams reported back to the group as a whole, the group then discussed their reviews of the Web sites and the usability of the different heuristics. On the basis of their comments and experiences, the authors revised the heuristics and then published them for a second try-out by 21 workshop participants during autumn 1999. Although some of these reviewers were seasoned Web professionals, in the remainder of this article we refer to this group as the “student reviewers.”

After the workshop, each student reviewer was assigned one set of the revised heuristics to apply to two Web sites: a Web site for the U.S. government tax department, the Internal Revenue Service (www.irs.gov); and a Web site for the Seattle baseball team, the Mariners (www.mariners.org). Because the heuristics on user involvement required specific data that needed to be collected by a site’s Webmaster and therefore was not available to the student reviewers, we excluded this set from this part of the try-out. Figure 1 summarizes the instructions the student reviewers followed in using the heuristics to review the sites and evaluate the usefulness of the heuristics.

In addition to applying the heuristics to two sites and writing individual reviews of the sites and the usefulness of the heuristics, the student reviewers were grouped in four-person teams (each person having used a different set of heuristics) to compare notes and write a group memo on the similarities and differences between their Web site reviews and their experiences as users of the different heuristics.

The third try-out was executed by practitioners. An impressive list of companies and organizations participated in the review, including IBM, Unisys, Real Networks, Microsoft, and several nonprofit agencies and services. We

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HOW TO USE THE HEURISTICS AND REVIEW THE TWO SITES

What parts of each of the two sites?

- ◆ The homepage
- ◆ A selection of three “second level” pages that fit with your set of heuristics (e.g., for the Author/reader heuristics look at an “About Us” page, for the Text comprehension heuristics look at pages that are rich in text)
- ◆ A selection of three “third level” pages
- ◆ One thread of information throughout the site
- ◆ A selection of five pages down in the site

So your evaluation will be based on 15 – 20 pages from each site.

HOW TO CONDUCT THE TWO EVALUATIONS

1. Familiarize yourself thoroughly with the set of heuristics you will be using.
2. Allow yourself three minutes for a first impression of the site. Then write down 10 keywords, describing those impressions.
3. Take half an hour to get to know the site. Just browse it until you have a feeling for what it is.
4. Define the audience(s) and purpose(s) the designers seemed to have in mind.
5. Start using the set of heuristics. Apply it to each page you are evaluating. Work your way through the questions/guidelines/etc. before going to the next page.

Figure 1. Task instructions for site review by student reviewers.

refer to these reviewers as the “Web professional reviewers.” A total of 28 reviewers from 16 Web development groups (7 corporate and 9 organizational/nonprofit) participated in the study.

In contrast with the student reviewers who each used only one set of heuristics, the Web professional reviewers applied all five sets to 3–5 pages of an informational Web site produced within their company. They were asked to identify and describe the intended audience and purpose of the Web pages they had chosen and then apply the guidelines to the pages. The Web professional reviewers received the job aid version of the heuristics, the quicklists, to work with.

Following the use of each set of heuristics, they filled out a short questionnaire to capture their impressions of and experience with the set. Reviewers were encouraged to annotate the quicklists with comments and suggestions, and to return an annotated printout of the evaluated Web pages to us. After applying the five sets of heuristics, these

participants responded to a summary questionnaire aimed at assessing their overall attitudes and perceptions about using heuristics for the purpose of evaluating Web site quality. This questionnaire also gathered data about participants’ experience with usability evaluation methods.

The Web professional reviewers also participated in a follow-up telephone interview (approximately one hour long) that focused on participants’ views on the following topics:

- ◆ Reasons for the reported ease-of-use of each individual set of heuristics
- ◆ Attitudes about the novelty and usefulness of the findings resulting from the heuristic evaluation
- ◆ Suggestions for improvement to the sets of heuristics
- ◆ Perceptions of differences between their usual Web site evaluation practices and using the five sets of heuristics
- ◆ Likelihood of incorporating the set of Web heuristics into their Web site evaluation practices

The questionnaire and interview responses provided a wealth of qualitative and quantitative data for revision of the heuristics. The data collection and analysis of the practitioners' review was conducted by Suzanne Amkreutz. An extensive report of the study and its findings can be found in her master's thesis (Amkreutz 2000).

Step 4: Revise and publish

Armed with the evaluation results of the reviewers and their reflections on the use of the heuristics, the authors once again revised their heuristics. In this stage, most effort went toward revising the condensed form of the heuristics—the job aids—on the basis of the reviewers' comments and feedback. Additionally, the authors completed the longer form of the heuristics, which expand in greater detail on the research basis for the heuristics. The articles that report the five sets of heuristics thus present them in two forms: the long form in which the heuristics are presented with explanation, support, and examples, and the quicklist, a job aid at the end of each article.

DISCUSSION

What we, as a team of authors and researchers, have achieved in the development process is offered for your inspection in the rest of this volume. The primary result of the research and development process is the five sets of heuristics. But we learned more than that. The project gave us much to think about regarding the value of research literature for practitioners, and about developing and using heuristics in general. This section highlights some of the more general discussion points that emerged from the reviewers' feedback.

An exciting project, for better and for worse

Within academia, the two departments that were involved in this research and development project are considered practice-oriented. Yet none of the authors of this volume had ever before been involved in such a deliberate and structured attempt to bring research findings to practitioners. At times we felt elated, when discussing the draft heuristics really made us see better what we were aiming at, or when we engaged in lively and critical debate with the users about the value of the heuristics. We felt that such spirited debate is the heart of knowledge creation in progress.

At other times we felt the same vulnerability and frustration many designers and communicators know from their experience with iterative design processes, where creation is interlaced with review and feedback cycles. After having pulled together the best available—but also sometimes blatantly incoherent—research findings applicable to such a new topic as Web information, we saw our darlings being scrutinized and sometimes torn apart by

eager reviewers. At such times, we despaired about the quality of our heuristics and wondered whether they would ever be ready for publication.

The reviewers, much to our relief, made us feel that our attempt to distill and digest research for practitioners was not lost on them. In fact, most Web professional reviewers commented in the interviews on the comprehensiveness of the heuristics. They made comments such as “This is a great summary of what is known about designing Web sites” and “I really appreciate having all this information in one document.” Their appreciation seemed to be motivated in part by the challenge of staying abreast of current research and handbooks while managing the demands of their jobs. Moreover, the Web professional reviewers also indicated that many people with Web responsibilities lack formal training in document or Web design. The heuristics can communicate Web design knowledge so it can be grasped quickly by an audience with a diverse educational background.

The final question in the interview of the Web professional reviewers concerned the likelihood that they would adopt the heuristics in their work practices. All them answered with a resounding “very likely,” although that answer was often qualified by statements such as “if I can adapt them.” The adaptations they had in mind concerned the way the heuristics were presented rather than the content of the sets of guidelines. As with the student reviewers' feedback, we took the Web professional reviewers'—often very detailed—recommendations for improvement to heart and applied them to the heuristics.

Usefulness of the heuristics

The first discussion point about our heuristics concerns whether they actually work. To answer that question, we can only rely on the users' perceptions of the usefulness of the heuristics. When asked (in the summary evaluation questionnaire, which 16 Web professional reviewers answered) whether the heuristics had helped them to detect strengths and weaknesses of their Web site, all of them agreed that applying the heuristics had led to the detection of problems in the site they had evaluated. A large majority ($n = 14$) agreed that the heuristics were specific enough to suggest solutions to the problems identified. Three reviewers also pointed out that the heuristics were useful for identifying strong points of the Web site. It appears that the content of the heuristics was helpful in detecting and diagnosing problems. But beyond that, they also helped users to evaluate the site quality in a more structured and thorough way. As one of them expressed it,

The physical presence of the heuristics in and of itself is just as valid in terms of its usefulness as is the content. To be able to check off these guidelines and to have them

grouped in the way they are grouped. This is a thorough and systematic way of doing it which I think is extremely useful.

The heuristics proved to have still another function in the Web design process, that is, making reviewers' comments more credible and persuasive with Web designers and other stakeholders. Reviewers' comments and even user feedback can easily be brushed away by designers as expressions of personal likes and dislikes, as one participant explained:

In communicating our results to the designers, to the rest of the groups, it was very important. With something like the heuristics in hand, you're able to say: "OK, here's what we did, and here's the set of guidelines that allowed us to discover that." You're not just saying, "I think this is a problem." So you have some kind of authority and some kind of justification for your search and discovery for that particular problem. It removes the threat of subjectivity from the analysis. . . .

The reviewers' perceptions of the usefulness of the heuristic evaluation for making a persuasive argument about Web site quality might be caused by the evaluation practices the Web professional reviewers currently use. During the interview, the reviewers were asked to describe their most commonly used evaluation strategy or process. Twelve of the 16 Web professionals (75%) indicated that their Web site is mainly evaluated in an informal way. They ask colleagues or site visitors for feedback, or rely on their own (implicit) knowledge of guidelines while examining Web pages. Such informal practices make it easy to dismiss comments as subjective and personal. Particularly in such cases, a more compelling argument can be made by using the heuristics as an authoritative referee.

In our view, favorable opinions might be a good predictor of benefit, but the benefit still has to be demonstrated. It will not be easy to establish conclusive proof that the heuristics work. If the heuristics are meant for designing and evaluating sites to improve them, their value must be demonstrated by improved sites, and not by favorable opinions alone.

The reviewers perceived the heuristics as useful, but does that mean that their value is proven?

Usability of the heuristics

While almost all Web professional reviewers voiced favorable opinions about the content and function of the five heuristics, fewer were positive about the ease of use. When asked in the summary evaluation questionnaire (filled out directly after using the heuristics), 69 percent of the reviewers (n = 15) thought the heuristics were easy to understand, and 56 percent (n = 9) thought the heuristics were easy to apply. From the interviews and annotations, however, it was clear that participants found much room for improving their ease of use. Since the authors were free to present the heuristics as they saw fit and thus presentation formats varied, recommendations for improving the usability varied, but some issues came up regularly.

Presentation format The presentation format of the heuristics varied: some were presented in a condensed quicklist format, and others looked more like research summaries with practice-oriented conclusions. The differences between the heuristics affected their credibility as an overall collection. The reviewers who used the five sets wanted the same format applied throughout, perhaps a very logical expectation. Although they valued the thorough treatment of underlying research literature and background information, they asked for a short, succinct, and scannable version of the heuristics. Even the quicklists they used were considered too long and too difficult to process in a work environment. They appreciated a quicklist that not only indicated problem types but also pointed out the site elements that could be affected by the problems described.

The demand for short and succinct heuristics might be hard to reconcile with the wish to cover complex aspects of Web site design (such as navigation) while simultaneously informing the user about its background (see the article by de Jong and van der Geest in this issue). There are many questions to be answered when one decides to turn the complex issue of Web design into a simple set of brief instructions, an approach that many Web style guides do use. What, for example, are the consequences for the usefulness of the heuristics when professionals select only small parts for application? Our data does not allow us to answer such questions at this time. The reviewers' comments seem to suggest a debatable tradeoff between usefulness and usability.

Prior knowledge and terminology Another usability issue voiced by the professionals concerned the language and terminology used in the heuristics. The reviewers marked some passages as being too theoretical, too abstract, or not well adapted to the intended users because of their phrasing. There was indeed much room for improve-

ment here, but the underlying problem was more than a matter of overly academic jargon. For each guideline that one user found difficult to understand, there was another user who remarked that it was easy or that the information was very familiar. Obviously, the prior knowledge of the reviewers varied widely, a fact that considerably influenced their judgment of the usability of the heuristics. A guideline that is too complex for one user might be simplistic for the next user. Concrete and especially visual examples might help to bridge the differences between users of the heuristics but conflict with the professionals' demand for short and succinct heuristics. It is a challenging problem to design "adaptive" heuristics that can serve users of very different educational and professional backgrounds, or novice and experienced Web designers simultaneously. Although the authors revised the heuristics according to the majority of comments made by the reviewers, we do not claim to have solved that problem.

Instructions for use Both the student and the Web professional reviewers also commented on the instructions they received for reviewing the Web sites. To stress the point that communication heuristics are "rhetorical" by their nature and therefore should always relate design decisions to the intended purpose and audience of a specific communication act, the evaluation instructions contained a brief exercise. The exercise asked the reviewers to familiarize themselves with the site to be reviewed and to define the intended audience and purpose before starting to evaluate the site with the heuristics (see Figure 1). Several participants stressed the importance of this exercise.

The reviewers were encouraged to record their findings on printouts of the Web pages to communicate the findings of the heuristic evaluation. The reviewers noted two problems with this recording method. By the end of their evaluation, the printouts were annotated with so many comments that they felt it would be impossible for outsiders to make sense of them. And since each of the five sets of draft heuristics was numbered separately (that is, all started with the number 1), making clear, abbreviated references to individual guidelines by number was difficult.

Some participants suggested the use of a worksheet to encourage the registration of page name and heuristics used. Such a worksheet could have a function beyond registration. If also designed with a diagnostic goal, it could serve to encourage diagnostic comments ("What is wrong here?") and suggested revisions, whereas marking the page printouts seems to favor detection and localization of problems ("Something is wrong here"). We feel such a worksheet, possibly integrated in an online comment tool for reviewing Web pages, has the potential of increasing the yield of heuristic evaluation, and we would like to see the value of such a worksheet investigated.

Function of the heuristics in the design process

The five sets of heuristics were intended to support both design and evaluation activities in the Web development process. In most of the summer workshop meetings and in several of the interviews and annotations of the Web professional reviewers, the issue of intended function in the development process came up. It is clear that the phrasing of a guideline defines whether it is perceived as design-oriented or evaluation-oriented. For example, guidelines that use phrases such as "Consider using . . ." or "Choose information that . . ." seem to support decisions during the design of page elements rather than evaluation. The reviewers indicated that the mix of design-oriented and evaluation-oriented heuristics, both within and across the five sets, was distracting and at times confusing. The comments of some reviewers suggest that even when design-oriented and evaluation-oriented heuristics cover the same Web page elements, they should be phrased differently to make them easy to use. To test that suggestion, a study should be set up with two alternative versions of the heuristics, one design-oriented and one evaluation-oriented.

Two Web professional reviewers wrote their own condensed version of the heuristics, and both rephrased guidelines as questions, thereby adapting them for evaluative purposes. Because the student reviewers and the Web professional reviewers used the heuristics solely for evaluation purposes, we have no way of knowing whether the heuristics work to support design rather than evaluation decisions.

INVITATION FOR FURTHER DISCUSSION

The collaborative research project reported in this issue of *Technical communication* in which we tried to bring research findings about effective presentation of information to Web designers has demonstrated that Web professionals as well as academics think that Web communication heuristics can be valuable tools in their Web design process. In our view, that statement should not conclude the research on Web heuristics, but rather it should serve as a trigger for further systematic research and development of heuristics. We hope that this special issue of *Technical communication* encourages its readers to join our efforts to identify valid and sound heuristics for Web design and evaluation that can enhance the communicative qualities of Web sites. **TC**

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