Bridging the Gap Between Research and Practice

Opportunities for Collaboration. Challenges and Possibilities.

BY DAVID MERWIN, Ph.D.

T he dramatic growth of information technologies such as Web-based services and mobile devices has created significant challenges for human factors and usability professionals as they cope with new HCI design issues. Fortunately, researchers and practitioners have an extraordinary array of tools at their disposal for answering HCI questions. From Web-based surveys and server log file analysis to eye-tracking and ethnographic techniques, the opportunities for investigating important issues from multiple perspectives and levels of detail have never been greater.

There is also a growing recognition by product development managers that companies can reap significant benefits by incorporating usability professionals and user-centered design processes into their development programs. Still, industry managers often fail to fully grasp the need to support collaborative efforts between their HF and usability practitioners and researchers. Industry professionals can help narrow this gap by convincing their employers of the need to provide sufficient resources for incorporating new methodologies into their product design and development processes. This effort requires more than budgeting funds for conference and workshop attendance—it means practitioners must spend a significant amount of their time exploring new ways to leverage research tools to address specific issues relevant to their projects.
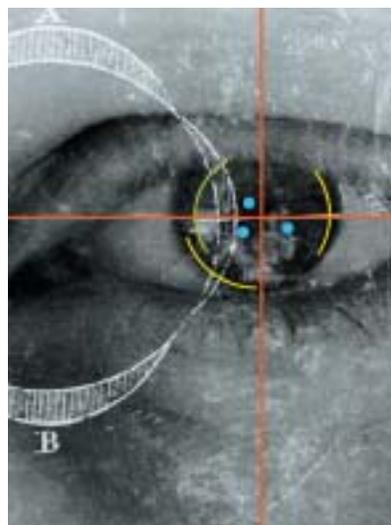
How Practitioners and Researchers Can Work Together

While there are endless possibilities for leveraging research techniques to support practical applications, the two examples presented here represent how practitioners and researchers can work together to develop tools to address practical issues: analyzing user navigation paths and tracking users' eye movements.

Analyzing Navigation Paths

One area that offers opportunities for collaboration is the study of click stream data from Web server log files. Visitors navigating through a Web site provide more information about their experience than is typically available in popular log file analysis packages. Much of this information is expressed in the characteristics of individual transition paths between screens or nodes within the site. The transition paths are characterized by a number of dimensions (time, number of transitions, frequency) that may be correlated with important variables of interest, such as the probability of completing a transaction, the time to fill in a form or subjective experience ratings. Researchers can work with practitioners to study the relationships between navigation
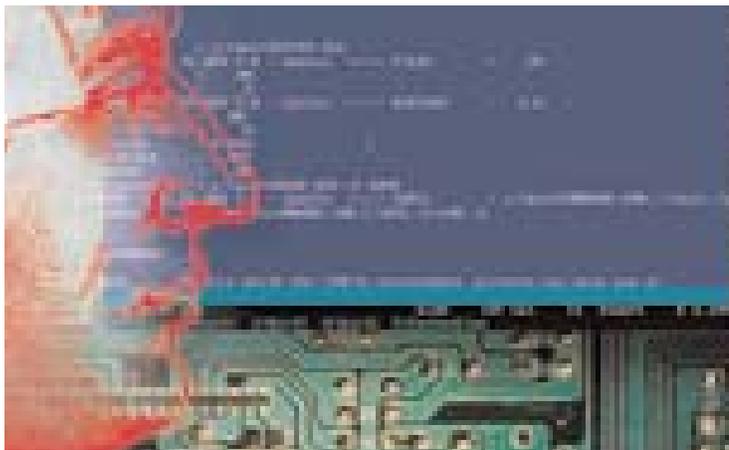
strategies. Certainly, there is no guarantee that these techniques will yield interesting results in all cases, but the potential benefits warrant their serious consideration.

To achieve results, practitioners and researchers will have to collaborate by bringing their respective skills to the table. By studying the relationships between transition paths and important practical variables, researchers and practitioners can work together to develop strategies for optimizing Web interface architectures for a variety of applications.

Tracking Users' Eye Movements

Another promising area is the use of eye-tracking techniques to support interface and product design. Continual improvements in the accuracy of eye-tracking systems and the development of relatively unobtrusive monitoring equipment—systems that use a camera placed near the user's screen, so that nothing is mounted on the user's head—have increased the usefulness of this technique for studying a variety of interface issues.

Exploited a half century ago by Paul Fitts and his colleagues in studying the arrangement of aircraft flight instruments, eye-tracking methods offer unique ways to study how people scan information on a variety of interfaces. (Fitts, P. M., Jones, R. E., & Milton, J. L. 1950. "Eye Movements of Aircraft Pilots During

characteristics derived from click stream data and important outcome variables.

Some of these relationships may be obvious from casual observation. For example, repeated transitions between a registration page and a help page should raise a red flag. Other relationships may only appear after performing statistical analyses such as multiple regression. If important outcome measures such as task completion or satisfaction can be associated with navigation characteristics, it may be possible to develop architectures that support more effective navigation

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Instrument-Landing Approaches." *Aeronautical Engineering Review,* 9(2).) For example, practitioners can see which interface elements attract and retain users' visual attention—the popular "stickiness" factor of images, video and text—and in what order users scan elements within a Web page. These types of data offer practitioners a new way to understand how their interface designs affect users' strategies and experiences.

Eye-tracking data also complement Web server log file analysis by filling in the gaps between clicks, and providing practitioners with insights into users' strategies for scanning a page before they click on an interface element.

In addition to standard eye-tracking measures such as the sequence and duration of dwells on specific interface elements, simply observing the real-time location of a test participant's gaze transforms usability tests in a number of ways. In this author's experience, test observers ask fewer probing questions that are of a

general nature. Rather, questions tend to be more focused on specific behaviors and strategies. This seems to have the effect of making the interaction between facilitator and participant (or co-participants, as some like to say) more efficient.

In other words, because observers can see what participants are looking at, they can more effectively target their questions to probe for specific information. In an important sense, this creates a more naturalistic environment for participants and gives observers a better feel for the strategies participants use to scan interfaces.

Of course, the use of eye-tracking research methods cannot replace other data-gathering techniques, but it can certainly offers insights that are not available from other collection techniques. Researchers trained in this area could offer valuable advice to practitioners who would want to explore eye-tracking's use in addressing practical design questions.

Stimulating Collaboration—Making the Necessary Commitment

The examples cited here are not intended to refocus practitioners away from their traditional activities such as field studies, task analysis, user profiles, conceptual models and heuristic evaluations. Rather, the intention is to encourage those working in product and system development to take a fresh look at how the wide variety of research tools available to them can be incorporated into their development processes.

Likewise, if researchers want their work to have relevance to colleagues who are making system design recommendations, they must keep up with industry developments and seek to understand the latest interface technologies, tasks and environments. For their part, practitioners working in the trenches must provide researchers with the raw material required to drive relevant research questions.

Finally, organizations must be willing to make the necessary commitment if they wish to get the largest return on their investment in human factors and usability expertise. At a minimum, companies' development processes should actively promote the consideration of new methods for addressing the many questions that evolving technologies are creating. Collaboration should be strongly supported as a means of creating and sharing new methodologies. In this rapidly changing environment, researchers, practitioners and product development teams must all effectively communicate their needs, as well as their resources, to ensure that the right questions are asked—and that the right tools are created and used to address those questions.

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