Getting the Picture

BEN SHNEIDERMAN

Ben Shneiderman says he is happy to be called a toolsmith. This professor of computer science and founding director of the UMIACS Human-Computer Interaction Lab has long been at the forefront of helping make computers more usable. In particular, Shneiderman works on ways to represent large amounts of data to help people grasp and absorb the information they need.

"He was one of the forefathers of human-computer interaction," says Mary Czerwinski, a researcher at Microsoft. "He saw from the get-go that you can't just design technology without asking if the technology is useful and usable. He embraced the user about 20 years before computer science departments got it."

To help create better interfaces, Shneiderman and his coworkers in the Human-Computer Interaction Lab, or HCIL, work with real users, such as biologists, librarians, and children, to figure out what people need in different contexts.

"I've had the pleasure of having seen my work go out in the world," says Shneiderman. In the mid-1980s, Shneiderman's group developed the first hypertext systems, allowing users to click on links from one part of a text to be

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taken to text in other documents. Initially, the linked files were on single machines.

Shneiderman and his coworkers published a key paper about hypertext in 1983. In the mid-1990s embedded text links became a component of the World Wide Web, recalls Catherine Plaisant, associate director of research in HCIL and Shneiderman's research partner for 20 years. "It can feel like forever," she says, between research and a real-world application. Similarly, Shneiderman's first paper on treemaps, a hierarchical system for representing information, was published in 1992, and the first commercial uses emerged in 1998.

Treemaps are just one method Shneiderman has developed to represent large amounts of data. Indeed, Shneiderman's specialty is to develop ways of harnessing the flood of digital information. A general principle that seems to serve all sorts of users well is to provide an overview that graphically represents all the data and then provide a way of filtering or zooming into data to see specific information on demand. "These visualization tools help people see more, the way telescopes, microscopes, and X-rays extended what people could see," Shneiderman says. After designing new ways to represent data, he then measures how well the representations succeed. "I'm a great believer in testing human-computer interactions," says Shneiderman.

In treemaps, which are now used widely, layers of information are nested in each other. For example, Smartmoney.com, with advice from Shneiderman, has built a treemap that represents stock market information. Different colors distinguish which stocks are rising in value and which falling. The area taken up by each stock represents a company's overall value. Rolling over specific areas with one's cursor reveals companies' names, and right-clicking gives access to each stock's history or news about the company.

Treemaps are used by other companies, as well. A genome biology Web site called Geneontology.org uses treemaps to catalog research on genes.

The HiveGroup.com uses the organizing scheme to display iTunes songs by popularity, and Peet's coffee uses treemaps to display its beans. Chevron-Texaco licensed treemap software from the University of Maryland to monitor production from their thousands of oil wells. A number of past students in Shneiderman's group have gone on to launch companies based on research they started in his lab on ways of visualizing data.

While Shneiderman is pleased to see these visualization tools become commercialized and widely used, he also works with people within the university to solve their specific problems. For example, he has helped sociologists at the University of Maryland represent data they have collected about terrorist incidents occurring since the 1930s. "We are working on real problems in the real world," Shneiderman says. "The key is taking a scientific approach and testing solutions." To test usability, he and his students can measure how long users take to do specific tasks, in order to grade how well a design worked. Over time, Shneiderman has become increasingly interested in case studies tracking people engaged in creative problems and discovery over weeks and months.

Shneiderman says he doesn't believe in separating theory from application. Working on real-world problems leads to foundational insights, he says. He receives funding from the National Science Foundation as well as large and small companies.

Among his colleagues, Shneiderman is also known for instigating discussions. He is often launching seminar series and getting researchers together to push forward the field of human-computer interaction. In recent years, his work has increasingly taken Shneiderman into the policy arena. He has taken up issues such as privacy, improving electronic voting systems, and extending the use of computer technology into poorer nations. "He's never afraid to take on the big challenge," says Czerwinski. "He's just not afraid. He boldly goes."

— Profile written by Karin Jegalian

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