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The Future of User Research

UBIQUITOUS

“ We begin with men and women and we end up with them. We consider the potential users' habits, physical dimensions and psychological impulses. ”

—Henry Dreyfuss, *Designing for People*, 1955

Illustrations by Cade Johnson



Expert observes product usage. ■ User self-reports product usage.



COMPUTING

When Dreyfuss wrote these words more than 50 years ago, user research was an emerging discipline. Today, understanding how people live, work and use products is critical to successful design. Properly applied, user research informs the appropriate ergonomic and functional characteristics of products. And at its best it can identify and capitalize upon innovation opportunities. Observation trumps conjecture and fuels insight.

The Research Problem

While there are a number of methods and strategies for when, where and how to conduct user research, the primary tools have always been the eyes and ears of the researcher. As a practitioner for the past decade, I have conducted research in cockpits, emergency rooms and trading floors. **Across different environments, products and users, I have made one consistent observation: the researcher's tools typically lag behind the technological sophistication of the products being researched.** In other words, the researcher is still limited largely to his or her own senses for understanding how people interact with rapidly changing technology.

While technical advances have assisted the research process, these tools typically increase, rather than reduce, the need for a researcher's observational expertise. For example,

digital video can capture detail and repeat or slow down time, but skilled review and analysis of the recordings are still required to render actionable design recommendations.

As technology proliferates, there is a greater need for researching how people are making use of it. Whether it's a surgeon in an operating room or a cook in the kitchen at home, access and observation in situ is often logistically challenging and always time consuming. Solid research skills are necessary to meet this growing demand, but skills alone are not sufficient. We need better research tools to capture more data from a wider range of users and situations than ever before.

Fortunately, there are emerging solutions. And ironically, the solutions may be found within the products themselves. But before we look to the near future, let's review some background on the past and present state of user research.

Current Research Approaches

In simplified terms, user research has typically followed two general approaches. In the most common and well-known method, a researcher serves as an expert observer. The researcher's observations and analyses of a product user's behavior serve as data for design decisions.

This *expert observation* approach remains the primary research model. For example, usability testing is a standard method in which a researcher observes individuals interacting with a product to complete a specified task. The value of expert observation is the depth and detail of new information that can be collected and integrated with the researcher's existing body of knowledge. However, this approach is limited by the need for an expert observer—that is, the bottleneck of the expert's availability limits scope, scale and speed.

A second method is *participatory research*. Although still arranged by an expert, the product users serve as self-observers and are responsible for collecting data about their experiences with the product. For example, an individual might keep a journal or log of daily experiences with the product, take photographs to document events related to product usage or even create a collage of images representing feelings associated with the product. While these user-produced artifacts are then interpreted by a researcher, it is the users themselves who are the primary source of the research information.

A benefit of the participatory approach is an increase in the level of personal insights. Moreover, a larger number of product use experiences may be documented because the data collection has been “outsourced” to the actual product users. On the other hand, product users are not skilled researchers and introduce their own biases and variability into the research process.

It is important to note that these approaches are not mutually exclusive, and, in fact, are often used together over the lifecycle of product research. For example, a researcher might employ participatory research to gain a broader understanding of how an existing product is used. That information could identify opportunities for improvement. As a product redesign is taking shape, expert observation can be used to more rigorously evaluate the effectiveness of the new design.

There are also clear costs and benefits to each of these two approaches. Expert observation tends to be more accurate and detailed but is limited in its speed and scope. Participatory research can gather data from a greater number of users in parallel but tends to be broader and introduces more variability into the process.

It may be evident now that there is something missing from the researcher's tool kit—a research approach that is both accurate and scalable and that does not vary with the biases of the researcher or the product users. In fact, the technology and methods to achieve this, which have been in use for years in the software arena, are beginning to emerge in the product design field.

Emerging Research Approaches

Researchers who study how software is used have had a tremendous advantage over their counterparts in the product design world. Software, of course, runs on computers, and computers, whether they are within desktops, laptops, personal digital assistants or mobile phones, are built to collect and store data. This data not only includes files, e-mails, photos and phone numbers but can also include metadata, an accurate and detailed record, about the use of the software, such as the frequency that a particular piece of software is used or the sequence of steps that a user undertook while using the software.

Researchers can analyze this data across thousands of users to determine trends in software usage, for example, identifying the most frequently used features, determining where people may be getting lost and quitting a software application or which controls are being used and which are not. Of course, this data requires validation and depth via more traditional research methods, such as expert observation, but it provides a tremendous head start.

Now consider having this ability for all types of products. To know, for instance, what features of a radio were being used by novices versus expert users, when people are doing their vacuuming or even whether a running shoe is enabling consumers to run longer distances. Several emerging technologies will enable these scenarios in the near future. Chief among these is the trend toward ubiquitous computing—embedding computing capacity in everyday products rather than separate, dedicated devices.

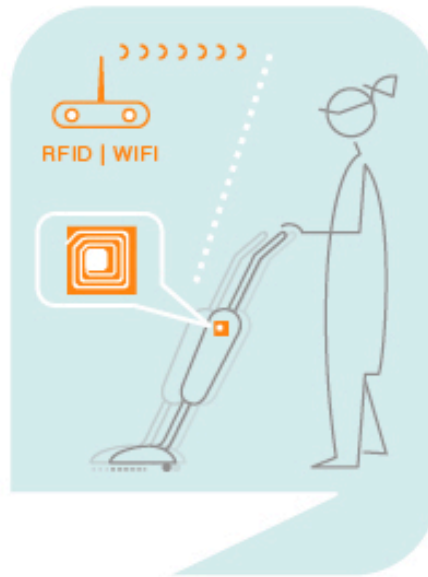
We've seen this in the increased capabilities of sophisticated electronic products, such as phones, automobiles and office machines, and this trend will continue to include simpler products such as home appliances, tools and analog devices.

One of the primary enablers of ubiquitous computing is RFID, or radio frequency identification technology. In a nutshell, RFID utilizes unobtrusive sticker-like tags to assign data to objects. RFID might be most familiar in its uses for electronic toll payments, but its value is much greater as it allows the world of products to interact with the world of data—assigning “bits to atoms.” For example, placing an RFID tag on a product enables that product to transmit real-time information that can include everything from defined characteristics (size, materials, price) to dynamic, descriptive data (current location, elapsed time, frequency of use). RFID can also be used to “tag” people via clothing or bracelets for reasons of identification, safety and security. Implanted tags are currently being used to identify lost pets.

RFID technology emerged out of areas like supply-chain management (for tracking products) and is now being utilized in a range of contexts, such as matching patients with their correct prescriptions. While these applications are clearly useful, there is also an enormous potential for this technology to support user research. Its potential is significant enough to merit a new approach to user research: *usage analytics*.

Applying Ubiquitous Computing to Usage Research

Usage analytics can provide an objective, accurate and scalable method to measure real-time product usage. One scenario where it may be effectively employed is in prototype evaluation: Research participants are each provided with RFID-tagged prototype products to use in their homes. Each participant is also loaned a receiver that can transmit the RFID data back to the researcher via wireless broad-



Product/system captures usage data.

band. Over the course of the research period, data about each participant's product usage is streamed to the researcher. This information includes the specific dates and times when the product is used and the duration of each use. If members of each participating household wore RFID bracelets, then the researcher could also identify who was using the product at different times and correlate that with previously collected data about each individual.

This wealth of data will then need analysis and interpretation by an expert, but the process has collapsed the time and effort to gather information and relies on technical, rather than human, accuracy. A researcher might use such data to determine, for example, that a product is being used less than expected. Follow-up, in-depth research might indicate the reasons for this—perhaps the product is too complex or too cumbersome or is being used improperly. Having access to the usage data can drive these questions and, ultimately, their answers.

Impact on Design

Usage analytics can serve as part of an overall effective research program combining multiple methodologies. It is a powerful tool for unobtrusive data collection with a relatively large number of participants. Most importantly, it is a complement, not replacement, for the depth and insight of expert observation and participatory design.

The benefits and opportunities new technologies present are powerful for both researchers and designers. Emerging research tools such as RFID tagging will have a significant impact not only on the accuracy and scale of user research but directly on the design of products. Designers will need to consider where and how to integrate information technology, or “bits,” into products where it was previously not a possibility. Products will transition from being the result of research efforts to becoming active participants in the research process itself. ■

For more information on ubiquitous computing: *Everyware: The Dawning Age of Ubiquitous Computing* by Adam Greenfield (New Riders Press, 2006).