Increasing Ease of Use

Emphasizing organizational transformation, process integration, and method optimization.

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Ease of use is a strategic focus within IBM and our User-Centered Design approach is the prime vehicle for achieving it. IBM UCD is targeted at designing competitive ease of use into the total user experience with hardware, software, and services offerings. It ensures that products are easy to buy, easy to unpack, easy to set up, easy to upgrade, easy to learn, easy to use, engaging, intuitive, and integrated. The IBM approach essentially involves having a multidisciplinary team design a total solution starting with the externals of a product—everything the user sees and touches—and then gather user input via UCD user feedback methods that attempt to understand users, evaluate design, and assess competitiveness. This article outlines the approach with particular emphasis on organizational transformation, process integration, and UCD method optimization.

Origins

A human-factors organization was first established at IBM over four decades ago and various usability and human-factors methods have been used over the years. A new approach, IBM’s version of UCD, was developed in the early 1990s. Based initially on Norman and Draper’s seminal work on user-centered system design [3], IBM’s UCD approach also incorporated key ideas from Hamel and Prehalad’s work on Strategic Intent [1], Wiklund’s sum-

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Challenges in a large and mature UCD organization like IBM are clearly different from those in a small pioneering group like ours at Danfoss. For us it is interesting but also difficult to understand how the widespread UCD employees are able to keep in contact and learn from each other. How do you nurture a continuous learning process?

IBM’s way of making UCD visible in the organization by using the company intranet seems to work very well. The idea of minimizing the physical distance between UCD employees and users by using the Web is very interesting and looks like it has succeeded at IBM. At Danfoss we should improve communication to the rest of the organization too, but until now we have been reluctant to develop computer-based tools out of fear that the effort will shift our focus from continuous competence-building to premature methods standardization.
mary of current industry practice [8], and an assessment of four decades worth of IBM usability/human factors experience. The approach continues to evolve. It has incorporated ideas from recent literature, such as Soloway and Pryor's learner-centered design ideas [5], from IBM project teams via the company's UCD Advisory Council, and from industry peers via conferences and standards organizations [2].

**UDC at IBM**

Making the transition from traditional human factors and usability approaches to full-scale UCD involves a major cultural transformation for an organization and a paradigm shift for practitioners. Several steps were taken to ensure a successful transition including identifying core principles, carrying out education, and integrating UCD into the company's business and development process. The five core UCD principles that communicate the essence of the approach focus on the following: understanding users, designing the total user experience with a multidisciplinary team, evaluating designs regularly, assessing competitiveness, and managing for users.

We particularly focused on introducing company employees to the new approach. An awareness presentation was delivered to all employees via internal television broadcast and development site visits. Overview and practitioner information was also made available to all employees via our intranet.

Classes were developed at both the introductory and advanced levels to teach UCD and a case-based executive workshop was developed for management teams. Finally, and perhaps most importantly, the principles, methods, and metrics were integrated into the company's business and development process. This also involved creating a set of UCD metrics that summarize key elements important in the management of UCD on projects at the project, division, and corporate level.

UDC at IBM is carried out at the product team level by UCD multidisciplinary project teams. The specialized disciplines of visual design, industrial design, HCI design, user assistance architecture, and user research specialists are core members of the project team along with marketing, product development, and support specialists. Three corporate positions and accompanying organizations were also formed to ensure the attainment of IBM's strategic objectives regarding ease of use. We have 25 UCD laboratories worldwide with a total of 78 individual lab cells.

IBM's UCD approach itself involves design special-
totype of the total user experience design. This externals concept design is evaluated by users in a design walkthrough, comparing the IBM design with the competitive solution.

Following this, participatory iterative lower-level design is carried out via low-fidelity prototyping design evaluation techniques and, over time, with increasingly higher fidelity prototypes and early product versions, with the latter being assessed with hands-on design validation studies. During early ship/beta, we collect information directly from users in the field with surveys and

Case Study: DB2 Universal Database

DB2 Universal Database used IBM UCD starting with the 5.0 release of its product. The management team made the commitment to use UCD and, in turn, formed a full multidisciplinary UCD project team and reorganized the development organization to include a UCD and development department. They carried out extensive UCD education throughout the organization, provided requisite funding for carrying out a full UCD plan, included UCD metrics in regular project reviews, and kept the entire organization focused on achieving their stated ease-of-use objectives with UCD. The team executed the UCD plan flawlessly, injecting innovative design and clocking more than 1,000 hours of user feedback sessions [4].

Task Analysis. Three full-day task analysis sessions were held using our groupware tools in the UCD lab group room. These sessions covered each of the target audiences. They focused on collecting, prioritizing, and detailing current tasks and task scenarios.

Competitor Evaluations. Two expert user competitor evaluations were held, one for database administration tasks and the other for application development tasks. The sessions also had allotted time for each of the design disciplines to drill-down on discipline-specific competitive product attributes.

Design Walkthrough. A day-long design walkthrough was carried out, focusing on the total solution design including marketing, the business and product proposition, terms and conditions, channel program design, education, technical support, and sales support. These additional elements of the total solution design were critical to the product’s success.

Design Evaluation. Various design evaluation sessions were held, ranging from low-fidelity and early-prototype explorations to high-fidelity task-based evaluations. These sessions occurred over eight months and at their peak were being conducted on a weekly basis. The two laboratories involved in the development of the product were linked together for many of these sessions through remote collaboration tools allowing designers in one location to explore designs with users in another location.

Design Validation. An extensive set of design validation tests was carried out on beta-level code going head-to-head against the competitor on the top tasks. These tests generated a large set of additional ease-of-use enhancements. Weekly metrics reviews and the management targets included in these metrics resulted in these enhancements getting into the product even though it was late in the development cycle.

Beta Feedback. Beta feedback was gathered using Web-based surveys of beta customers. In addition, the code was instrumented for recording user interactions. And to complement the instrumentation, a tool was included to enable users to add free-form comments about problems they were having while using the product. These various channels for beta feedback were used to gather user satisfaction data, user problem reports, and to understand how the various product components were being used. This remote feedback approach to beta tests is an integral part of the tools previously discussed.

Benchmark Assessment. The final design validation tests achieved results indicating that our product demonstrated superior ease of use and ease of learning.

Results. The results of our own studies, business results, and trade press reviews all substantiate the improvement made in ease of use. For example, PC Week used the words, “...a vastly easier client setup procedure, integrated replication and a fresh new interface”, InfoWorld pointed out that the “latest DB2 exceeds competition ... administrative functions are well integrated into the easy-to-use Control Center interface,” and Information Week wrote that “Installation, on both the server and client, is mind-numbingly easy ... Universal Database is breathtaking for its enormous leap into ease of use.”

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usage instrumentation. Finally, a benchmark assessment is carried out comparing the final product with the competitive solution.

The particular type of UCD method used at any point is dependent on a variety of characteristics of the project. For example, a task analysis study may involve extensive customer site visits in the case of a product targeted at an entirely new market, whereas a Web-based survey may be used to validate core tasks for a highly stable product in a traditional well-understood market.

Optimizing UCD

Most UCD methods are still heavily labor-intensive. It takes too much effort to efficiently collect user information and technology is typically under-utilized. In addition, there is an increasing need to get input from users quickly and from an international audience. Finally, multidisciplinary teamwork is a difficult yet often critical ingredient to great design. We developed a set of tools to address these challenges.

A time-consuming activity for most organizations is recruiting appropriate study participants. We implemented a Web-based recruiting survey on our external Web site (see Figure 2) together with appropriate incentives such as “Win a ThinkPad” targeted at particular user types. We’ve also captured our product registration information in a database for customers who have indicated willingness to be contacted by us. Both of these databases can be queried by practitioners across the company. The use of this tool has dramatically increased our teams’ ability to contact worldwide users quickly.

The Web also provides a great opportunity to gather specific information rapidly from a worldwide audience. Our UCD survey tools provide an easy, flexible way to do this [6]. We developed a set of survey templates (see Figure 3) and made the most frequently used ones available in automated form and put our other popular surveys into a customizable form. The former requires just five minutes of the practitioner’s time to create a product requirements and satisfaction survey that analyzes results automatically. The latter provides templates for a Web-authoring environment, which in turn are published on the Web with results provided to the practitioner in a spreadsheet file.

Another time-consuming and resource-intensive activity is hands-on user testing. Under certain circumstances, we now do remote testing across the Internet. This is particularly useful for doing tests with geographically dispersed users.

We also have tools that make it possible to monitor (with users’ knowledge and consent) key behaviors with the product (such as the number of times a particular part of a product was used, the number of invocations of a help window, and so forth). Other tools can capture context-rich information about particular events (such as all screen activity.

Figure 2. Typical Web-based recruiting survey.

Figure 3. An automated survey template in customizable form.
four minutes preceding an event that a user identified as significant—for example, a problem).

One way to increase the effectiveness of multidisciplinary design teams is to provide groupware tools for team communication in addition to face-to-face meetings. We developed a tool to capture design descriptions and images, user information for studies and tests, track user problems, and discuss issues electronically. Another tool allows the company-wide practitioner team to explore issues, discuss enhancements, and share studies and designs.

Lastly, a central database tool captures and tracks core UCD information and metrics and provides the management team with various views of the information used for their projects.

IBM’s UCD is now well-established across the company and is yielding significant increases in the ease of use of our products [7]. We intend to work with our UCD staff as well as with our UCD peers across the industry to further enhance UCD to ensure the continued increase in the ease of use of information technology products.

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References

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