Usability: The New Dimension

by Artemis March

The mission of industrial design has traditionally been to support engineering and marketing by improving the look and feel of a product. Designers have imparted style, simplicity, or beauty to products that might otherwise have appeared clunky and ordinary. But a handful of pioneering companies—such as Thomson Consumer Electronics, Apple Computer, and Northern Telecom—are extending the parameters of design, pushing to the forefront something that has been an afterthought at most companies: a product’s usability.

The new designers have expanded what usability means to cover several dimensions of people’s interactions with products. In traditional design, usability largely concerned ergonomics—that is, embodying in physical forms knowledge about how people reach for, pick up, carry, hold, operate, sit in, and otherwise use artifacts. But user-centered design goes beyond that definition to encompass the cognitive aspects of using and interacting with a product, or how logical and natural a product is to use, as well as the emotional aspects, or how people feel about using it. For example, is the product frustrating to operate, or does it invite use and provide an enjoyable experience?

User-centered designers try to understand those interactions—the dynamic space between user and product—and translate their understanding into a product’s form. To that end, they draw on field tests of prototypes, psychological models of cognitive processes, and a wide range of other methods, including observations of how people compensate for deficiencies in existing products.

Some companies that have established user-centered design groups have begun to articulate how to incorporate this broader definition of usability into their products. Admittedly, this is no easy task. The new dimensions deal with feelings about experi-
ences that defy concrete definitions—for instance, about how a car handles. In a first attempt at pinning down its concept of usability, Thomson has declared that all its entertainment products must be engaging, foster a sense of discovery, and eliminate fear. And Northern Telecom has defined usability as simplicity, ease of use, and conspicuous customer value.

For many companies, the shift to user-centered design will require the expansion of their design groups to include people with backgrounds in computer science, cognitive psychology, and visual design, as well as traditional industrial designers. Many companies will also have to rethink and reorganize the design process—and elevate their design groups to put them on a par with other functions—to ensure that usability is designed into the product from the outset. With the gap between competing products narrowing in terms of performance and quality, the experience that a product delivers is rapidly becoming the key to offering distinctive value to the customer.

The System Link Universal Remote

Thomson first discovered that user-centered design could give it a significant advantage over its competitors in 1988 with the development of its highly successful System Link, an ergonomically oriented remote control that can operate various types of products made by different manufacturers. System Link’s success (millions of the units have

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USABILITY

This base design for the PowerBook was refined over many design test cycles.

Design Model:

been sold built credibility for the company's design group and convinced many skeptics inside Thomson that people are willing to pay for usability.

Designed for Thomson's RCA brand, the System Link remote control has buttons of different colors, shapes, and sizes that make it easy to use, even in a dark room. The rounded edges of the base and the soft rubber buttons make the unit comfortable to hold and operate. And, providing additional ease of use, the VCR buttons are clustered separately from the television buttons.

The separate clustering, among other features of the remote, might not have been possible had the development team followed Thomson's traditional approach to design, in which the design group's work followed the layout of the circuitry. In this instance, the electrical engineers offered to modify the circuitry in the final design in order to separate the VCR buttons from the television buttons.

This kind of teamwork was deemed so successful that Thomson changed the standard design process used in its development projects. Today the design group, which for the first time reports directly to Thomson's chairman, does its work first, with input on feasibility and alternatives from the rest of the multifunctional development team. Only then do the electrical and mechanical engineers proceed with their work.

The PowerBook 140/170

Coming up with a winning product concept often is not the outcome of a neat, orderly process. Indeed, sometimes the most successful concepts emerge gradually from a series of exchanges both between the development team and targeted customers and among the members of the team. Apple's PowerBook 140/170 was the result of such a
Engineering Model:
Trackball size, button shapes, and their placement were tested extensively for usability.

Final Model:
The PowerBook 140/170, a seven-pound notebook introduced in October 1991, became a billion-dollar business in its first year.

process of learning by doing. Thanks to the PowerBook’s design — including ease of use, ergonomics, fit, and finish—Apple sold 400,000 units in the computer’s first year. The PowerBook became a billion-dollar business overnight.

After the 1989 failure of its 17-pound Mac Portable, Apple was under intense time pressure to secure a solid foothold in the computer notebook market (7 pounds or less). The driving force behind the product concept at the outset of the PowerBook project was simply to get to market the best “small computer” possible within 18 months.

The definitive PowerBook concept evolved during seven cycles of designing, building a prototype, field-testing that prototype, and trying to incorporate the feedback into the next design. This iterative process enabled Apple designers to discover the cognitive and emotional themes that would become the essence of the product and to translate those themes into the details of the actual design.

One critical quality that emerged was “portability”: usability in a variety of environments, including, for example, an airplane seat. A second was “object value”: the designers came to realize that, for users, a notebook constituted a personal object, an extension of the user, not a piece of business equipment. In the end, Apple discovered that it wasn’t simply designing a “small computer.” Rather, through its design of the Power Book, it was telling a story about portability and object value.

Apple’s belief that usability is of paramount importance led to its choice of two components that turned out to be critical to the PowerBook’s broad appeal. One was an internal disk drive, which most users want in a portable computer; the other was a large trackball for fine motor control of the cursor. There was one problem, however: both components added size and weight. In order to uphold its
commitment to usability, the development team decided to reduce other internal components to meet the size and weight targets.

The Vista 250/350 Modular Phone

It is one thing for a given development team to come up with a powerful product concept that incorporates usability. But it is quite another for a company to accomplish this time and time again. By empowering its design function and making it a full partner in the development process, Northern Telecom was able to do just that: it created a powerful design that could serve as a foundation for a family of interactive screen phones and developed a design process that could be used to create other new product concepts.

In 1992, Northern Telecom’s CEO decided to elevate the importance of the design group, which had been essentially a support organization that provided services to others in the company. Believing that Northern Telecom was grossly underutilizing design as a competitive weapon, the CEO gave the group a mandate to redefine its role. As a result, the design group made itself accountable for ensuring that the company’s products distinguished themselves in terms of their design—including usability. The group further concluded that the guiding principles of usability should be simplicity, ease of use, and conspicuous customer value.

The newly empowered design group then asked the multifunctional development team that was developing the interactive phone to reassess its design. Under the new standards, the team concluded, the current design was inadequate. Among other things, the screen was too small.

Following extensive discussions about what customers value, the team identified two key charac-
User-centered design is still in its infancy. Few companies have gone as far as Thomson, Apple, and Northern Telecom in articulating the dimensions of ergonomic, cognitive, and emotional usability that guide a product's design. Companies can begin by articulating the usability themes most appropriate for them and interpreting what those themes mean for individual product families. Ultimately, user-centered design can help a company forge a unifying identity for its products.