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Converging Perspectives: Product Development Research for the 1990s

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CONVERGING PERSPECTIVES: Product Development Research for the 1990s

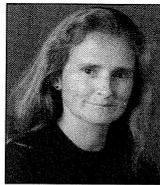
THE ENORMOUS NUMBER of product failures indicates that companies need to dramatically improve the research that goes into the development process so results are simultaneously useful (needed), usable (understandable), and desirable (wanted). Elizabeth B.-N. Sanders believes this will happen when design managers integrate multiple research techniques—several of which she describes and illustrates—in a process referred to as “converging perspectives.”

By Elizabeth B.-N. Sanders

Why so many product failures?

Eighty percent of all new products introduced to the marketplace today fail shortly after introduction.¹ Why? Is it because of product proliferation—because there are so many choices available today at point-of-sale that consumers simply stick with the familiar? Is it because of the recession, with consumers demanding more value for their money? Is it because we, as researchers, designers, and product developers, know what consumers need and want, but can't get it to them in a usable, timely, and cost-effective form? Or is it that we don't really know what consumers need and want?

I will argue here that we don't really *know* what consumers need and want and, because of this, have been making many marketplace mistakes based on inadequate information and inaccurate assumptions. I am proposing that perhaps the current state of research is part of the



LIZ SANDERS CONTRIBUTES A COGNITIVE ERGONOMIC PERSPECTIVE TO THE RESEARCH AND DESIGN OF COMPLEX PRODUCTS AND INFORMATION SYSTEMS AT FITCH RICHARDSON SMITH. SINCE JOINING THE FIRM IN 1982, SHE HAS BEEN RESPONSIBLE FOR INTEGRATING THE INFORMATION DESIGN DISCIPLINE INTO THE COMMUNICATION DESIGN PROCESS.

problem. Traditional research methods for marketing don't seem to be satisfying the needs once served in the past. For example, more companies are complaining that it takes too much time and money to use test marketing to gauge consumer reaction to new products.² Market research staffs and budgets have been slashed by as much as 50 percent over the past ten years.³ Usability testing from the human factors participants in the product development process doesn't seem to be solving the problem either. It can help to detect and resolve problems in the execution of a product concept, but does not address the discovery of users' needs as impetus to a product concept.

1. Christopher Power, "Will it sell in Podunk? Hard to say," *Business Week*, August 10, 1992, p.47.
2. Power, p. 46.
3. Mark Landler, "The 'Bloodbath' in Market Research," *Business Week*, February 11, 1991, p.72.

I propose a new approach to research methods that incorporates research into the entire development process from discovery of consumer/user needs, to development of products addressing those needs, and finally, to delivery of the desired product to the marketplace—and ultimately to the consumer and end user. This goes far beyond merely understanding the consumer to requiring that he or she be involved throughout the design development process itself. This approach crosses the line between research and design, blurring the distinction between the two. Furthermore, it changes the role of the consumer in research from passive informant to active participant in the product development process.

Successful Products in the 1990s

Certain industries are starting to recognize that products can be desirable but not useful. As Peter Burrows noted last year in an article in *Electronics Business*, "The U.S. electronics industry has a dubious but time-honored tradition of making technologically excellent products that bomb, simply because customers don't need them."⁴ Clearly, we have been making inaccurate assumptions about consumers' needs, or perhaps forgetting to address their needs in pursuit of technologically driven innovation or the ongoing preoccupation with feature-laden electronics.

For products to be successful in the 1990s, they will need to meet consumer needs simultaneously from three perspectives: usefulness, usability, and

desirability. A *useful* product is one that consumers need and will use. A *usable* product is one they can either use immediately or learn to use readily. A *desirable* product is one they want. A product such as a favorite pair of shoes can be useful, usable, and desirable, all at the same time.

In the past, success of a product in the marketplace was likely if at least two of these three criteria were met. Many home electronic products today are useful and desirable, but not very usable. Video cameras, VCRs, and stereo systems fall into this category. Kitchen products may be usable and desirable, but not particularly useful. Like egg poachers and food processors, they sit unused in the kitchen cupboard because they really didn't save time or make life easier after all. Products that are useful and usable, but not desirable, are the ones we don't choose to purchase. Many products targeted toward the aging marketplace today—such as hospital-type bathroom fixtures that do the job but don't appeal to the potential user—fit into this category.

In the 1990s, new products will probably need to meet consumers' needs in being useful, usable, and desirable all at the same time. Product success might be measured both at point-of-sale and at point-of-use. Should a product that is purchased but not used be considered a successful product? Although it would be considered a success from the manufacturer's and retailer's points of view, it would probably not be considered a success from the purchaser's and/or the user's points of view. The environment cannot tolerate another generation of marketplace successes and at-home failures. A product can fail "at home" for one of two reasons: either it isn't very useful, like some kitchen gadgets, or it's not usable. Ads by RCA and Mitsubishi for home electronics products now stress usability. Surely selling usefulness will follow, but we first need to determine what people *really* need and want.

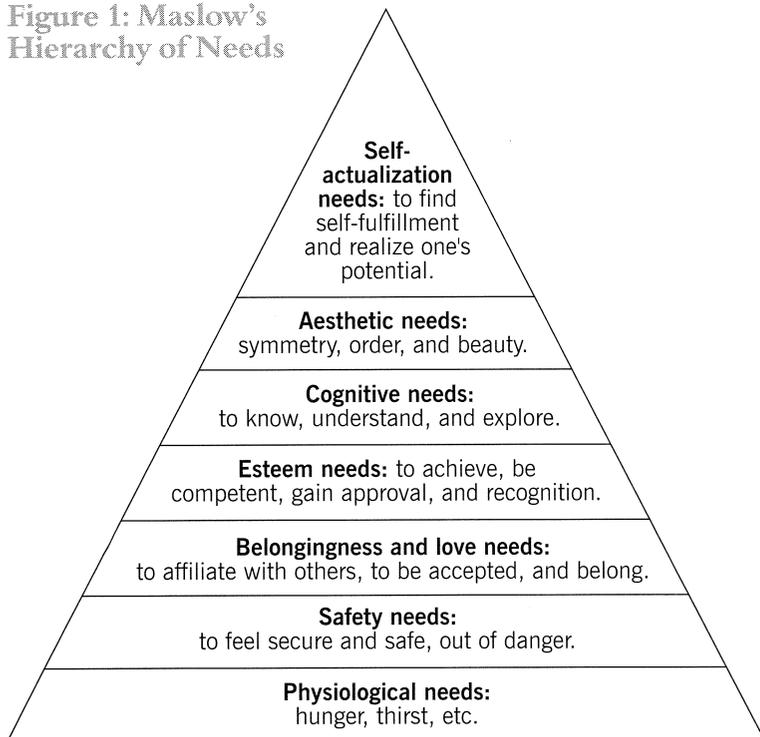
Determining Real Needs

Larry Keeley, President of Doblin Group, an interdisciplinary design planning firm, describes the emergence of tailored goods as a crucial strategy for businesses in the 1990s. Tailored goods address the end user's "personal preferences and real needs" by offering what they want, when they want it, and how they want it. Like a pizza. He shows that tailoring isn't really a new phenomenon, but "a rediscovery of how business was conducted prior to mass manufacturing, mass distribution, and mass consumption."⁵

4. Peter Burrows, "In Search of the Perfect Product," *Electronics Business*, Vol. 17, July 17, 1991, p. 70.

5. Larry Keeley, "Tailoring: A Design Strategy for the 1990s," *American Center for Design Journal*, Vol. 6, No. 1, 1992, p. 74.

Figure 1: Maslow's Hierarchy of Needs



Keeley offers a model of “tailorability strategies” as a design strategy for the 1990s. This model identifies eight generic tailoring strategies, such as “kit of parts,” “smart media,” “made to order,” etc. It is a powerful framework to use in making business decisions and also potentially quite useful in the design process. But it does not address how to determine what consumers really need and want.

“Tailoring” implies that we give consumers options from which to pick, and the control to choose from among these options. But how do we determine the options in the first place? How do we know where consumers need choice? How do we find out what consumers want?

The concept of “need” is a very complex psychological phenomenon. Any theory of need addresses many different levels of need. One of the most widely known theories is Maslow’s hierarchy of needs.⁶ Maslow identified seven levels of need, ascending from the basic biological needs present at birth to more complex psychological motives that become important only after the more basic needs have been satisfied. He claimed that the needs at the lower levels needed to be at least partially satisfied before needs at higher levels could become important motives for behavior.

In the product development process, we are typically interested in many different levels of need. Products must be safe and understandable. We may purchase products to be accepted by, or to gain recognition by, others. At higher levels, products may satisfy aesthetic and, occasionally, self-actualization needs. Furthermore, consumers typically are not good at expressing what they need. Their needs may be latent—consumers are not even aware of them—or tacit, *i.e.*, consumers are aware of their needs but cannot articulate them. While they might be able to recognize what they want when confronted with a visual representation, that may be too late in the product development process to help the designer.

The concept of consumer/user needs is not an issue to be dealt with at a surface level. The multiplicity of levels of need and the relative inability of consumers to express those needs is a crucial issue for product development research in the 1990s. This is clearly not an issue that can be addressed in a traditional focus group or in usability testing. One method is not enough! If the product is not useful, if consumers don’t need it, then why bother to make it usable? Why bother to make it at all?

Converging Operations: Multiple Research Perspectives

How can we determine what consumers will find useful, usable, and desirable in a product? And then how can we deliver it? This is a complex problem, one that clearly requires the convergence of *multiple*

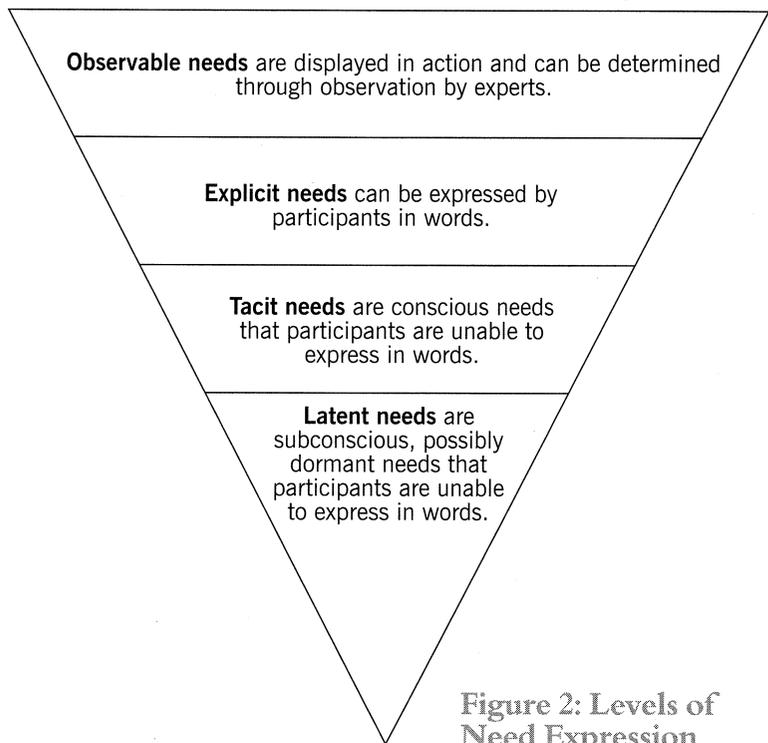


Figure 2: Levels of Need Expression

research perspectives. The most important methodological tool we have is the use of converging operations, the use of two or more methods of investigation to approach any product development question. Converging perspectives help us to identify the overlapping information, findings unbiased by any single research method.

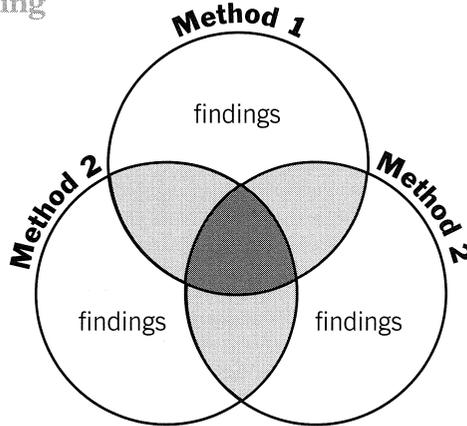
For example, in exploring color issues in children’s products, any combination of these approaches would be worthwhile.

- Observe how they use color in their clothing.
- Observe how they use color in their art.
- Talk to them about color, their favorite colors, colors that boys like, colors that girls like, etc.
- Provide the children with “color construction kits” so that they can create their own color palettes.
- Ask them to select their favorite objects from similar objects painted in different colors.
- Ask the children to “color in” drawings of potential products.
- Ask them to draw a picture of the “ideal” product, using crayons or colored markers.

Others outside the product development research field have realized the power of converging operations. Neuroscientists finally have in their hands many new techniques such as MRI, PET, SQUID, SPECT, and EEG, with which to explore and understand the brain. The neuroscientists “rely

6. Abraham H. Maslow, *Motivation and Personality* (N.Y.: Harper and Row, 1954).

Figure 3: Converging Operations



on an alphabet soup of technologies—each technique adds a different piece to the neural puzzle....⁷⁷ For example, MRI (magnetic resonance imaging) provides snapshots of the brain in detailed images. PET (positron emission tomography) tracks blood flow, which is related to brain activity. The SQUID (superconducting quantum interference device) picks up magnetic fields, a different view of brain activity. Each technique reveals a different perspective and provides different information. While the results of a single technique may be difficult to interpret in isolation, the big picture becomes clear when interpreted in the context of an alternate perspective.

The power of converging operations is exciting new ground—wide-open territory for researchers involved in the product development process. Creativity is essential. It is a necessity that market researchers work with human factors researchers and other applied social scientists to explore this territory. It is also critical that researchers explore it together with designers. Just as researchers have begun to collaborate successfully with designers in the design process, so should designers collaborate with researchers in conducting research.

A number of different research methodologies relevant to the product development process already exist. They come from various fields, most notably from traditional market research, psychology, and anthropology. For the purposes of this discussion, I'll group them together into just a few major categories: observation, classification, conversation, description, and participation.

Observation methods look at what consumers do, how they act or behave, and can reveal the temporal dimension of behavior. They can be obtrusive or unobtrusive, although it is usually best to observe unobtrusively to get *real* behavior. Some observational research techniques include task analysis, store audits, path analysis, and behavioral tracking. Results are typically videotaped or photographed for

repeated reference and analysis.

Classification methods attempt to classify individuals into meaningful groups. For example, demographic segmentation divides consumers into groups based on variables such as household size and formulation, age, income, occupation, and education. Demographic trends give some, but limited, insight into marketplace needs. Psychographic segmentation divides consumers into meaningful segments based on their activities, attitudes, interests, and opinions. It provides some insight into what consumers think, and can provide an operational measure of consumer lifestyle.

Conversation involves communication between people, as researchers talk to respondents in order to learn about their attitudes and opinions. But respondents may tell us what they think we *want* to hear rather than what they actually think. Only children reliably express what they actually think. Contrasting conversation (what consumers say) with observation (what consumers do) is a powerful example of converging operations. Conversation works well with verbal participants, but may not be the best way to work with less verbally skilled individuals, such as very young children. Some conversation research techniques include face-to-face or telephone interviews and mall intercepts.

Description uses classification, observation, and conversation in order to discover and document how consumers perceive their world by looking at their social relationships, language, the tools they make, and the artifacts they construct. Ethnographic research methods such as participant-observation, key-informant interviewing, and life-history documents are examples of description techniques borrowed from cultural anthropology.

Participation, like description, relies on classification, observation, and conversation. Unlike description, the aim of which is to *understand* consumers, the aim of participation is to include and involve consumers in the design process. Participatory design research is user-centered design taken to another level. It focuses not only on the users, but on all "stakeholders" in the product development process, including:

- end users
- purchasers
- installers/assemblers/manufacturing
- service representatives
- engineers
- market strategists
- designers
- ergonomists

7. Sharon Begley, Lynda Wright, Vernon Church, and Mary Hager, "Mapping the Brain," *Newsweek*, April 20, 1992, p. 66.

Participatory design research entails the active and direct involvement of all product stakeholders in and throughout the design process. Participatory design puts the designer in a new role as the “enabler” of the design process. It puts the stakeholders in a new role as well—direct contributors to the product development process. But stakeholders typically need help in their expression of needs, so many of which cannot be communicated verbally. New research tools are needed that enable product stakeholders to express themselves visually through images or in three-dimensional form. The discovery and development of such research tools requires the collaboration of researchers and designers. Participants often can’t directly contribute to the design process unless they are given means other than words with which to express themselves.

An example of a new research tool is “velcro-modeling,” a tool used by a small research/design team in response to a complex problem that gave very little opportunity for extended field research. The task was to configure the layout of all user-interface elements in the operator’s cab of a large military loader, which involved the placement of nearly 150 distinct dials, switches, indicators, buttons, and lights. The problem couldn’t be solved in the one and a half days in the field budgeted, so a “velcro” model, a full-sized, three-dimensional model with movable walls, windows, control panels, etc., was developed. Every user-interface element was color-coded by system and velcro-backed so it could be repositioned at will. Once the elements were positioned by the design team, their solution was presented to the development engineers. They refined the solution in a few hours by sitting in the cab and repositioning the elements based on a more intimate understanding of the various tasks involved. This refined layout was then presented to the individual representing all military end users, who was able to refine that layout quickly, based on his understanding of the task from extensive field experience with similar vehicles.

The velcro model allowed all stakeholders to participate directly and simultaneously in the placement and juxtaposition of every physical user-interface element. Velcro-modeling was successful not only from the product point of view—it enabled a good solution—but also from the people point of view. It served as a common ground of communication for all stakeholders and facilitated collaboration tremendously. The results were interpreted in a final appearance model, and the engineering prototype is being test-driven by military end users for six months before production begins.

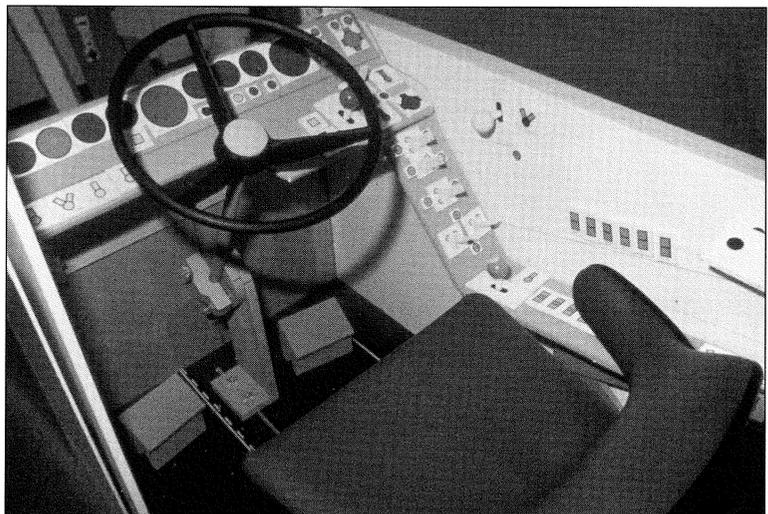
Projective Techniques

Finally, we must examine the researcher’s most

challenging task, discovery of those needs consumers can’t describe, many of which may be only latent. We’ve found the use of projective techniques, with materials specifically designed for discovery in the product development process, to be promising. Projective measures involve the use of research materials having ambiguity of meaning and a multiplicity of responses. The classic example is the Rorschach or Inkblot test, which can be interpreted in many different ways. It is believed that projective techniques tap into subconscious (latent) user motives. Projective techniques, since they tend to use visual stimuli, are also quite useful for eliciting and giving people a way of expressing tacit needs.

One example is “projective expression.” Here a natural grouping of consumers, such as members of a family, work together to construct collages from pre-selected photographs, images, colors, words, and phrases. As they create the collage, they are invited to describe their reasons for selecting particular stimuli for their collages, but they are never required to do so. Participants can modify the images, edit the words, or create their own stimuli to enhance the collage, and the exercise quickly becomes a very personal expression. Collaboration (or lack of it) between family members is readily apparent. The collage they create can represent many different topics of interest from abstract notions like “family values” to more concrete ideas like “electronic products.” The flexibility of the approach makes it a method applicable to many stages in the product development process.

In projective expression, participants create two collages for each topic of interest. The first collage represents the current situation, while the second, made from an identical set of images and words, represents the ideal situation. It is the comparison of the current and the ideal that is of primary interest.



VELCRO MODELING

Current and ideal collages may have nothing in common, may have elements in common, or may actually be identical. It is in the comparison of current and ideal collages that the expression of tacit and latent needs can be uncovered.

Converging Perspectives: Lessons Learned

Experience with research in the product development process has provided some valuable lessons.

- Don't be afraid to experiment. Research, like design, needs a conceptual development phase where ideas are explored.
- Use previously successful research methods, but try out one new method whenever the opportunity to apply converging operations presents itself.
- Improvise. If serendipitous discoveries are made during the research task, follow them.
- Be spontaneous and flexible. Quickly drop methods that aren't working.
- Use converging operations on both small and large development programs. We've found that the best ideas often emerge under the tightest of constraints.
- Develop methods and tools that engage participants in the creation and manipulation of visual artifacts. Three-dimensional artifacts are generally better than two-dimensional representations; the more real, the better.
- Be considerate of the individual differences among participants. Multiple intelligences⁸ exist—linguistic, musical, logical/mathematical, spatial, bodily/kinesthetic. Encourage expression of ideas in many different modalities.
- Use a multirelational database in which to store the data. The computer is an ideal tool for helping the researcher observe the power of converging operations.
- Don't take the process of analysis for granted. Look to the power of interdisciplinary teams for new perspectives on analysis.
- The researcher can contribute as much to the design process as the designer can contribute to the process of research. ♦ Reprint #9234SAN49

Suggested Readings

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