The Reconciliation of Research and Creativity in Industrial Design

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Introduction

The industrial design profession in the United States has evolved over the past 50 years. This evolution has included a shift to a research based practice of industrial design from an art/intuitive-based practice. Sometimes willingly, sometimes kicking and screaming, many industrial designers have come to terms with formalized research in the design process. They have reconciled the need for creativity with the need to do valid and credible research that justifies and helps direct design activity. Although this journey has been littered with obstacles and barriers, companies have actually witnessed increased innovation and market success as design creativity and research rigor have been reconciled.

Collaboration between disciplines has produced research methodologies and creative processes that satisfy the needs of fast paced product development and design. Along the way, research methods have been adopted and adapted so that the creative process is enhanced, rather than stifled by research. This reconciliation has come as a result of industrial designers working with and being influenced by others such as anthropologists and psychologists. This paper also emphasizes the importance and impact that design research has had on product design; reminding design practitioners and educators how important it is to collaborate and strive to adapt to the ever-changing world of product design.

This evolution and growth of research-based design has been observed through an extensive literature review and in-depth interviews with some of the key figures in design research history. Interview participants included: Jane Fulton Suri, Darrel Rhea, Liz Sanders, Brenda Laurel, Patricia Moore, Arnold Wasserman, and Steve Wilcox. Each has expert familiarity with research in product development. Magazines, journals, and books were also reviewed. Much of the information was gained from International Design magazine (formerly known as Industrial Design magazine) and Innovation, the professional journal of the Industrial Designers Society of America. Each issue was scanned for information, articles, and reference to this subject with 50 years and approximately 500 issues having been reviewed.

Resisting Research

Over the last 50 years, some industrial designers viewed research, especially traditional quantitative marketing research, with distain or disregarded it as having little value in product design. In 1958, U.S. companies spent between $150,000,000 and $250,000,000 on marketing research for new product development (Fleishman, 1958). Discussions about the value of research in product design were heated.

Research constituted a "straight-jacket" according to some industrial designers as described in a major article in Industrial Design magazine in the late 1950-s (Fleishman, 1958). Subsequently, in the 1960s and 1970s this kind of reaction to research persisted; some industrial designers felt rigorous scientific methods limited the creative and intuitive aspect of an industrial designer’s activity. They insisted that subjective feelings should sometimes be allowed to override research (Bowen, 1964; Burridge, 1972), saying that research was, “a fancy way of telling him [the designer] something he already knows through long experience.” (Fleishman, 1958).
To some, creating or discovering innovative solutions to design problems is at the core of what industrial designers do. New and innovative products help both the customer and company that produce products; the kind of creativity that facilitates innovation is a key attribute that can determine an industrial designer’s value. To some degree, this kind of creativity requires the artist’s capacity to intuitively blend design elements and think outside the norm as products are developed. Many Industrial designers resisted research; seeing it as an inhibiting factor on the creative process that appeared to threaten, slow down, or compromise the potential for innovation.

Through the 1980s many industrial designers continued to resist research as a mainstream practice during the design process. The topic was openly debated at design conferences and some leaders in the industrial design profession did not see the value of it. For example, Darrel Rhea, a leading design researcher and current CEO of Cheskin, conducted design research for ID2 (currently known as IDEO) in the 1980s found that designers, “either resisted it, or were highly ineffectual about it.” (personal interview 9 November 2004). From the perspective of Arnold Wasserman, former design leader at NCR and Xerox, many industrial designers felt that they had, “expertise required and all the knowledge that they needed without having to go systematically to the field, and find out information about people.” (personal interview 29 December 2004). Up until the last 15 years, industrial designers have typically taken an art, or intuitive, based approach to product design rather than a research based approach.

However, over the last 50 years, a few industrial designers did not resist research. They actually used it as an integral part of their design process – as an aid to producing innovative products. They promoted the activity among peers and with clients. Some examples include: Observation and personal interviews conducted by Henry Dreyfuss Associates (Dreyfuss, 1955); designer participation and time motion studies conducted by designers for Montgomery Ward tent and “pop tent” design (McCullough, 1957; Ferebee, 1959); and observation, interviews, and surveys by Byron Bloch for Statham Medical Instruments (Kelly, 1966).

These few designers who used research to their advantage remained in a minority group until a process of reconciliation began to occur in the late 1970s and early 1980s. For the majority, indifference and contempt toward research remained. One of the barriers to reconciliation came from conflicting goals of designers and researchers.

**Conflicting Goals**

Traditionally, researchers and designers expect to achieve different outcomes as a result of their work. Industrial designers found difficulties when working with researchers that do not have the responsibility of applying research to real-world design problems. The conflicting goals between traditional researchers and designers are highlighted below.

The definition of research changes depending on whom you ask. To designers, research is most helpful when it provides inspiration, justifies direction, and is defined as something that aids in the process of forming a synthesis between diverse elements. The traditional researcher, on the other hand, tends to break problems down into testable elements. William Capitman (1971), President of the Center for Research in Marketing Inc. aptly described the researcher’s definition of research as, “careful, systematic, patient study and examination in some field of knowledge undertaken to establish facts or principles.” Designers, on one hand, seek to create something new; while the researcher, on the other, seeks truth. These noble yet conflicting goals (sometimes described as art versus science) can create division between the disciplines. These conflicting goals, which pit designer against the researcher, are usually established through discipline specific training that professionals receive in higher education.
Regarding training, Capitman (1971) further described the designer’s approach, “The designer...is grounded in the fine arts, in the manipulation of symbols and graphic elements for the purpose of creating effects. Thus, the designer tends to rely upon his own taste, training, and judgment as to what is appropriate to make the public respond in a given manner.” Industrial design education programs are usually housed in, have strong roots in, or are closely aligned with traditional visual arts training. Many industrial design departments or programs have traditionally coexisted in the same department, college, or school as graphic design, interior design, and in many cases, painting and sculpture. Coming from this background gives industrial designers the training in rapid visualization and form giving that they are often known for. Put another way, the goal tends to be to create objects that express meaning. This background serves as both a benefit when it comes to practice and a hindrance when it comes to understanding those with a background in the sciences – where objectivity, validity, and reliability are the primary goals. Designers tend to focus on creating something new, while researchers tend to focus on the research itself.

Conflicting goals has not helped designers view traditional research as relevant. Joseph Koncelik (1972), a design educator at Cornell University discussed, “…the designer has been a consumer of research rather than a practitioner of research. However, extracting relevant information from other professionals is not always feasible. In many instances, information about a job does not exist in any form relevant to design. Thus, in the past few years, designers have been engaging increasingly in research activity. This has presented many problems to both designers and the professionals they work with.”

The focused and specific nature of research findings disconnected with context often serves to stifle innovation and squash new ideas. Certain, more quantitative and traditional forms of research (e.g., surveys and questionnaires) often miss finding the context, activities, attitudes, and beliefs of the people that are being studied. For example, a marketing survey that shows a preference for a specific feature on an existing product (e.g., a button in a specified location) might be used to guide the development of a new product. This guiding feature preference might serve to eliminate other potentially innovative solutions or alternative design concepts (e.g., a touch screen interface) automatically favoring only those concepts that include that feature in a similar way. The likely result would be another product that is similar to the norm, rather than one that is new and innovative. Although research in this case offers some useful information, it can actually hinder the creative process to some degree – decreasing its relevance to design.

Lacking rigorous and systematic research methods in traditional industrial design training, other, more scientific based disciplines have not recognized how designers have attempted to incorporate human needs, wants, and desires into product design. Many have fallen under criticism by those in the social sciences by not clearly linking design with the findings of social science research. For example, Koncelik (1972) discussed, “…in the last five years, many social science researchers have voiced their concern for the lack of recognition by designers of the importance of human, social and psychological functions.” The need to somehow incorporate more rigorous human centered research into the product design process began to be felt by some in the industrial design community during the early 1970s.

Whether on their own or encouraged by others, prominent individuals within the industrial design community called for a more rigorous or scientific approach to design research in practice and education. The following quotations illustrate: “The designer is desperately in need of serious social science study.” (Capitman, 1971). A partner at Henry Dreyfuss Associates said, “The designer needs to improve the extent and quality of his knowledge about people – not just in an intuitive way, although this will always be an essential aspect of his involvement, but in an organized scientific sense...The multidisciplinary team, of which the designer would be a part,
has access to an impressive array of techniques for observing and evaluating the human being.” (Diffrient, 1973). A design educator at Auburn University said that industrial designers should be concerned with behavioral and psychological areas of study (Schaer, 1975).

These calls for increased emphasis on formal research did not impact the day-to-day practice of the majority of industrial designers through the rest of the 1970s and 1980s. Most industrial designers seemed unwilling to adopt formal research methods into the design process. Through this period to present, Daryl Rhea, CEO of the well known design research firm, Cheskin, described the attitude of many designers, “…they (industrial designers) were dragged, kicking and screaming, to the table” to discuss integrating formal research into the design process (personal interview, November 9, 2004). Also during this time frame, descriptions of the product design process in industrial design literature only rarely mentioned research as having a significant role (see Table 1 and 2 below).

Reconciliation

The resistance and conflict industrial designers have had with research was not such a problem when research was conducted in their own way. As mentioned above, some industrial designers have actually been conducting their own brand of design research from the professions earliest beginnings in the 1930s (see Rothstein, 2000). But the process of reconciliation on a large scale did not progress in a major way until the late 1970s and early 1980s when several firms began hiring social science research experts at several firms.

The industrial designer's version of design research was probably viewed as crude by others with scientific research training but was actually quite effective from a design process point of view. It consisted mostly of simple end-user observations and interviews. The key to success was that it was done quickly and that the designers did the research themselves – gaining real empathy for the end-user. They were able to apply what they learned directly to the new product design.

Henry Dreyfuss (1955), perhaps one of the best known early leaders of the industrial design profession, described his approach to research this way, “I have washed clothes, cooked, driven a tractor, run a diesel locomotive, spread manure, vacuumed rugs, and ridden in an armored tank. I have operated a sewing machine, a telephone switchboard, a corn picker, a lift truck, a turret lathe, and a linotype machine. When designing the rooms in a Statler Hotel, I stayed in accommodations of all prices. I wore a hearing aid for a day and almost went deaf. I stood beside a big new gun at Aberdeen Proving Grounds when it was fired, and was catapulted off my feet. Members of our office have spent days and nights in airport control towers and weeks on a destroyer during maneuvers. We ride in submarines and jet planes. All this in the name of research!"

Fleishman (1958) also confirms how some industrial designers were conducting research: “...it is their need to develop an exploratory, informal and even freewheeling approach to research – while remaining creative designers – that has conditioned them to maintain their amateur standing as researchers...The manner in which designers have fitted research to design is a reflection of their awareness of the limitations and dangers of over-formalized M/R (market research)."

This “freewheeling” approach to design research, as Fleishman describes above, has advantages and disadvantages. The advantages include direct designer contact with: context, activities, attitudes, and beliefs of the people for whom the product is being designed. Direct designer involvement is critical because it automatically creates empathy with the user, can help generate
innovative ideas, and more information can be gathered that would not be provided (or missed) by an outside researcher or report.

The disadvantages include lack of credibility and validity to others. “Freewheeling,” if not conducted with a certain amount of rigor, can actually yield inaccurate results that can cause a design team to base its design direction on incorrect findings. For example, if an industrial designer fails to incorporate the principle of triangulation in the research activity the chances for misreading the customer increase. This can be upsetting to clients, can reduce the chances for product success on the market, and can threaten the livelihood and reputation of the designer or firm doing the work.

During the late 1970s and early 1980s, social science experts were hired by key design firms. This was at least partially due to business leaders demanding that more sophisticated design research take place before, in some cases; millions of dollars were invested in product development.

These experts included anthropologists, psychologists, and other social scientists. Some of the more prominent ones that have had the greatest influence are included in the book, Creating Breakthrough Ideas (2002). Some of the researchers mentioned include: Jane Fulton Suri of IDEO; Liz Sanders of Sonic Rim (author of, Generative Tools for Co-Designing in Collaborative Design); Steve Wilcox of Design Science (author of numerous articles in several professional journals and product development periodicals, such as, A Tool for Design Research, in Innovation, the journal of the Industrial Designers Society of America; Rick Robinson of E-Lab; and Lucy Suchman of Xerox PARC (author of Plans and Situated Actions). All of these leaders have social science background and training, such as undergraduate and/or graduate degrees in psychology and anthropology, which helped direct their early design research activities with a social science perspective.

The reconciliation between research and design came about not only by people working together, but also by an evolution of research methods. The approach commonly used was anthropological; typically not as lengthy or holistic as traditional ethnographic studies that can involve years of contact with research subjects. The design research methods gave greater insight into the: context, activities, attitudes, and beliefs of the people who were being studied. The research conducted had direct application and relevance to design because of the development of adapted anthropological research methods. Typically, traditional research methods used in anthropology (e.g. observation and interviewing) were time compressed to appropriately fit the demands of fast product development; these methods were also used in a targeted way that revealed unmet user needs. Arnold Wasserman terms the result of this evolution of design and inclusion of these research methods in the design process as, “research based design” (personal interview 29 December 2004). Figure 1 below describes this evolution.

Figure 1. Evolution of research-based design
The Iomega Zip Drive, developed with the help of Liz Sanders, is an example of how evolved design research methods have been successful and relevant to design. Sanders used a form of user participatory design research that generated valuable insights used in the creation of this product. The Zip Drive incorporated user defined features including: how the disc is inserted and extracted, how the media can be seen through a window, and even how terms, such as “stuff,” were used to market the product through analyzing the frequency of terms used (personal interview, November 11, 2004). This popular product was released in the mid 1990s and stood for many years thereafter as a standard in removable data storage.

These pioneers at integrating scientific research methods with design process have brought a great deal of credibility to the notion of design research. When a design team includes those with expertise in scientific research methods there can be a heightened level of sophistication attached to the design process. These individuals also aid in the process of reconciliation between the need for research and creativity. There are many design firms today that have benefited from this advance and some specialize in design research as their primary offering to clients (e.g., Sonic Rim and Lextant).

**Standardization**

Today, and for approximately the last 15 years, industrial design has evolved into a profession that practices research-based design in addition to art/intuitive based design. The tables below describe how and when this has occurred. There are those who still dismiss research as a mere distraction, but those are perhaps in the minority. Many products designed today do not actually demand a research based design approach, such as designing/updating products for a new model year. However, research based design is especially helpful when new product innovation is desired.

Table 1 below describes how many products were designed using design research as documented in *Industrial Design* magazine and *Innovation*, the journal of the Industrial Designer’s Society of America. In each case, the featured design team conducted the actual research with customers, rather than relying solely on outside research provided by researchers.

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Table 1. Products designed using research methods

Era IV (1990-2005) shows a significant increase in products designed using design research. It did take some time after social scientists became involved, but after their influence was felt and documented, others began to employ design research methods more frequently and with higher levels of sophistication. In 2004 alone, seven (out of fourteen) gold Industrial Design Excellence Awards (IDEA) were given to designers who used a research based design approach.

Table 2 below suggests the level of sophistication that research based design has achieved. Shown are the different documented methods found in the same sources mentioned above in Table 1. Individual methods may have been used many more times than shown here; the number reflects only the number of different methods used during the timeframes.

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Table 2. Different methods used to collect and analyse data

The number of methods used to collect and analyze data jumped sharply in era IV. Interestingly, the most common methods used continue to be simple user interviewing and observation. However, the sharp increase in number of distinct methods shows that other, and increasingly sophisticated methods, are being used to collect and analyze data that is relevant to design. Some of these methods include: Video Ethnography, Task Analysis, Storyboard Mockups, Instance and Pattern Analysis, Experiential Sampling, Ethno Methodology, Velcro Modeling, and Scenario Building.

What is not shown on these tables is the empathy developed on the part of the designer or design team for the end-user. Empathy can help facilitate a better design and is a non-quantifiable reason for designers to conduct research. Jane Fulton Suri discussed, “…so it’s not just a question of rationally understanding, but actually getting to a level of real emotional identification with the people who are going to be using things; because that drives a more imaginative design outcome” (personal interview, November 2, 2004).

Conclusion

While research has been conducted by a minority of industrial designers throughout history, research based design has become standard practice in industrial design and product development. The industrial design profession is evolving. Figure 2 compares research-based design with art/intuitive design, and indicates a shift towards research-based design.

![Figure 2. A shift in industrial design approach](image)

The shift that has occurred will most likely continue into the future as industrial design continues to evolve. Perhaps we will witness a time when most industrial design conducted will be research based. If current trends are extrapolated that will certainly be the case. Whatever happens, research-based design is likely to be with us for a long time. This has broad implications for design practice and education.

Future practice will be impacted because increasing numbers of clients will likely demand that sophisticated research be conducted before they invest in product development. They will demand this because of the many success stories that popular business magazines feature. Many business leaders are already aware of the success that firms such as IDEO has brought to clients – and their approach is well documented.
Future design education will have to be forward thinking. Programs that fail to incorporate research based design methodology into the curriculum may also fail to provide a competitive education for students. The current demand for research savvy industrial design graduates appears to vary depending on who is hiring. However, the number of businesses that use research based design seems to be increasing (see Table 1).

To advance research based design practice, universities could take a lead role in developing new design research methodologies. Traditionally, industry has led the development of design methodologies but the university environment could be a hotbed for methodology innovation because of cross-discipline influence and an environment that ought to be conducive to exploration. Design educators could leverage this opportunity more.

Are barriers to reconciliation between research and creativity still with us? Have we learned from the past? These questions should be of concern to practitioners, educators, and students of design. Like anything else, evolution through reconciling differing points of view can be difficult but well worth the effort. Reconciliation can occur when high regard for diversity and unity toward common goals are present. In this case, the result has been an evolution of the industrial design profession itself.

References


