

DESIGNER EVOLUTION: A STORY OF RECONCILIATION BETWEEN CREATIVITY AND RESEARCH IN INDUSTRIAL DESIGN

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1. Introduction

Like a youth struggling through adolescence, industrial designers in the United States have experienced a kind of evolution over the past 50 years. This evolution has included a shift to a more “research based” practice of industrial design, rather than a heavily “art/intuitive based” practice. Sometimes with open arms and sometimes “kicking and screaming,” many industrial designers have come to terms with research in the design process. Many industrial designers have reconciled the need for creativity with the need to do valid and credible research that justifies and helps direct design activity. This difficult but worthwhile journey has been fraught with obstacles and barriers. During the journey designers have actually witnessed increased levels of innovation and market success as creativity and research have been reconciled.

The story of this journey emphasises the influence design research has had on product design. It also reminds those involved in product development how important it is to collaborate, accept new ideas, and strive to adapt to the ever changing world of product design. This story is largely about the collaboration that various disciplines have experienced and adaptations that research methodologies and creative processes have undergone in order to satisfy the needs of product development and design. Along the way, the industrial design profession has evolved; adapting and incorporating research methods so that the creative process is enhanced. The evolution has come as a result of those working within the profession and from without.

This evolution 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. 50 years and approximately 500 issues were reviewed.

2. Resisting Research

Perhaps the core of what industrial designers do is to create or discover innovative solutions to design problems. These solutions are often seen through improved or novel products that benefit users and the companies that supply them. Innovation, to some degree, requires the artist’s capacity to intuitively blend design elements and think outside the norm or expected as products are developed. It seems natural that industrial designers would resist constraints on the creative process that appear to

threaten, slow down, or compromise the creative process. Some industrial designers viewed research, especially traditional quantitative marketing research, with distain or disregarded as being of little value to product design. Back in 1958, the discussion was pertinent because United States 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 60’s and 70’s 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 [Arnold 2005, Bowen 1964, Burrige 1972], saying that research was, “a fancy way of telling him (the designer) something he already knows through long experience.” [Fleishman 1958].

Through the 1980’s many industrial designers continued to resist design 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 80’s found that designers, “either resisted it, or were highly ineffectual about it.” [personal interview 9 November 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. 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].

Though this attitude was widespread, a few industrial designers did not resist research and actually used it as an integral part of their design process – as an aid to producing innovative results. They promoted the activity among peers and with clients. These few, however, remained a minority until a process of reconciliation began to occur in the late 1970’s and 80’s. The primary barrier to reconciliation came from conflicting goals of designers and researchers.

3. Conflicting Goals

Researchers and designers traditionally 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 following points highlight the conflicting goals between traditional researchers and designers:

3.1 Definition

The definition of research changes depending on who you ask. To designers, research is most helpful when it is defined as something that aids in the process of forming a synthesis between diverse elements such as a customer’s desires and what can be manufactured. The traditional researcher, on the other hand, tends to break problems down into testable elements. William Capitman [1971], President of 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.” On one hand, the designer seeks to create something new; the researcher, on the other, seeks truth. These noble, yet different or conflicting goals (sometimes described as art vs. 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.

3.2 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. An industrial design department or program has 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 immediately known for. Again, 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, while researchers tend to focus on the research itself.

3.3 Relevance

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 often miss finding out the context, activities, attitudes, and beliefs of the people that are being studied. For example, a marketing survey that shows a preference for a certain feature on an existing product 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 – automatically favouring 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 a bit of research in this case offers some useful information, it can actually hinder the creative process to some degree. If developing innovative products is necessary to be competitive in a market, then certain kinds of research can be less relevant to design.

3.4 Rigor

Lacking systematic research methods in their background and training, industrial designers have been viewed as being disadvantaged in the realm of scientific research. Many have fallen under criticism by those in the social sciences through disregard or 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."

Those involved in the industrial design community have actually called for a more rigorous or scientific approach as well – whether it be through practice or education. The following individuals said:

- William Capitman [1971]: "The designer is desperately in need of serious social science study."
- Niels Diffrient [1973], a partner at Henry Drefuss associates: "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."
- Walter Schaer [1975], a design educator at Auburn University, said that industrial designers should be concerned with behavioral and psychological areas of study.

4. Reconciliation

4.1 Industrial Designers

Industrial designers have actually been conducting their own brand of design research from the profession's earliest beginnings in the 1930s. But the process of reconciliation did not really progress in a major way until the late 1970s and 80s when several firms began hiring social science research experts at several firms. A small segment of industrial designers have always conducted their own brand of design research. This version of design research was probably viewed as crude by others with scientific research training but was actually quite effective; consisting mostly of simple user observations and interviews. The key to success was that the designers did the research themselves and were able to apply what they learned directly to the new products they designed [Arnold 2005].

Henry Dreyfuss [1955], perhaps one of the best known and 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 free wheeling 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).

Some other industrial designers, who have conducted design research prior to the mid-1970s, include: Don Wallace, auditorium seating; Robert Propst, Herman Miller; Byron Bloch, Statham medical instruments; and Richard Russell, Industrial Design Consultants.

"Free wheeling" design research, as Fleishman describes above, has advantages and disadvantages. The advantages include direct contact with: context, activities, attitudes, and beliefs of the people for whom the product is being designed – and the designer is doing the research. Direct designer involvement is critical because it automatically creates empathy with the user 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. "Free wheeling," if not conducted with proven research methods, can actually yield invalid results which 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 error increase. This situation can be upsetting to clients, can reduce the chances that the product will be successful, and can threaten the livelihood and reputation of the designer or firm that is doing the work.

4.2 Social Scientists

During the late 1970s and 80s social science experts began to be hired by key design firms. This was at least partially due to business leaders demanding more sophisticated design research be conducted 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 seemed to have the greatest influence are included in the book, *Creating Breakthrough Ideas* [2002]. Some of the researchers mentioned in the book 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 had some ties to the social sciences in their 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 approach that they commonly used was highly qualitative and anthropological. Though not typically as extensive as traditional ethnographic studies that can involve years of contact with research subjects, the methods developed and employed included the context, activities, attitudes, and beliefs of the people who were being studied. The research conducted had direct application and relevance to design. The reconciliation between research and design came about not only by people working together, but by an evolution of methods. Arnold Wasserman terms the result of this evolution, “research based design” [personal interview 29 December 2004]. Figure 1. below describes this evolution.

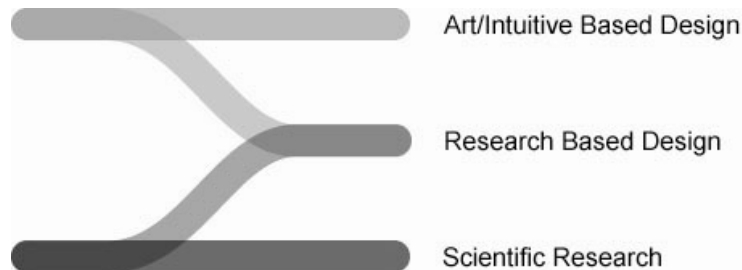


Figure 1. Evolution of research based design

The 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 which generated valuable data 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 which was standard for many years in removable data storage.

These pioneers, that integrated 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 expert familiarity with scientific research methods there is a heightened level of sophistication attached to the design process and the resulting product. 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).

5. Evolution, sophistication, and standardization

5.1 What happened

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 discount 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.

Table 1. below indicates documented products that were designed using a research based approach over the last 50 years. The descriptions for these products were found in *Industrial Design* magazine and *Innovation*, the journal of the Industrial Designer’s Society of America. There were probably more research based products designed during this period but they were not included in the reviewed literature. The table suggests that the number of products designed, with a research based approach, has probably increased and that the discussion about research based design has increased. In each case, the design team conducted the actual research with customers, rather than relying solely on outside research provided by researchers.

Table 1. Products designed using field research methods

Era	I (1955-1964)	II (1965-1975)	III (1976-1989)	IV (1990-2005)
Products	4	7	7	25

Era IV 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 [Arnold 2005]. The annual Industrial Design Excellence Award (IDEA) is one indicator of the merits of a new product; in 2004 alone, there were seven out of fourteen IDEA gold winning products designed using research based design.

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

Table 2. Different methods used in field research to collect and analyse data

Era	I (1955-1964)	II (1965-1975)	III (1976-1989)	IV (1990-2005)
Methods	3	9	10	32

The number of methods used to collect and analyse 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 analyse data that is relevant to design. Some of these methods include: Video Ethnography, Task Analysis, Story Board Mock-ups, Instance and Pattern analysis, Experiential Sampling, Ethno Methodology, Velcro Modelling, and Scenario Building [Arnold 2005]. What is not shown on these tables is the principle of empathy on the part of the designer or design team. 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].

6. Conclusion

These findings point to a standardization of research based design in the practice of industrial design and product development. The industrial design profession is evolving. Figure 2. compares research based design with art/intuitive design and a rough estimation of the proportion of how much they are used in product design.

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 practice and education. Future practice will be impacted in that many clients will demand that sophisticated research be conducted before they invest in product development, or that it be conducted during the design process. They will demand this because of the many success stories that anybody reading a popular business magazines will read. Many companies and business are already aware of the success that IDEO has brought to their clients and their approach is well documented. An opportunity lies in expanding the billable design activity alternatives that design firms and companies offer clients. There is also the opportunity to benefit humanity if one believes that a user-centred product, designed using a research based design approach, can be of greater benefit than an art/intuitive inspired product.

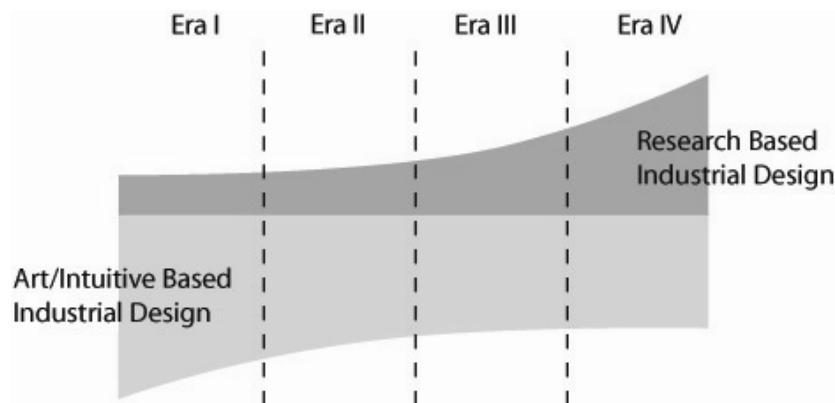


Figure 2. A shift in industrial design approach

Future education will have to keep up with the demands of industry. “Old school” professors that fail to understand or incorporate research based design methodology into the curriculum may also fail to provide a competitive education for their students. While the demand for recent research savvy design graduates is not clear with all firms and companies this could change rapidly. The opportunity exists at universities to take a lead role in developing new design research methodologies. Traditionally, industry has led the development of design methodologies but that could change. The university environment is ideal for this kind of work because of the many faculty and graduate students involved in research and the cross-discipline influence that can take place. Unfortunately, many educational programs do not leverage this opportunity to its fullest extent.

Are the 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. This paper has shown several key barriers to reconciliation that can also be eliminated from other areas of product design where conflict exists. They are:

- Closed mindedness
- Disregard for other points of view
- Inflexible methodology
- failure to adapt
- Ignorance
- Lack of unity or common purpose

Like anything else, designers and researchers need to evolve, otherwise they face extinction.

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