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DESIGN FOR THE INFORMATION SOCIETY: THE RESEARCH PARADIGM

1. INTRODUCTION

Research in design for the information society has progressed in three waves. The first wave of the information society took place more than a hundred years ago. One by one, the producers came up with the telephone, electric household appliances, the radio and television, and automobiles, each of which has since become an integral part of the modern consumer household. In the now-ending second wave, the military and later business developed digital and mobile-communication technologies for their purpose. The technologies spread to households as computers, mobile telephones, the internet, digital television and digital radio. The basic question of design for the third wave - human computer interaction - is fundamentally different from earlier questions. The basic question is how will design work be carried out, and how will design research help us to understand design work.

The "information society" will open up the emerging future as a wholly new research topic for design, designers and design research. Design is the phase of the product development process where product developers create develop new product concepts for other product developers to develop and implement. Designers are product developers who participate in design. In the information society, designers will to an increasing degree get to deal with catalyzing products - tools, toys and artworks - that are as "open" as possible, so as to accommodate the multiplicity of new uses and new users. They will have unprecedented degrees of freedom in designing product concepts, user interfaces and cultural meanings. They will shape the reality that consumers will experience more than did designers for the traditional pre-industrial society or than do the designers for the current industrial society. Design research is only beginning to ask the right kind of questions. Who are the users in an information society? How ought designers conceptualize products in the information society?

In seminally answering these pertinent questions, we propose a framework that can function as a paradigm in directing design research for the information society. It outlines the topic of study, establishes boundaries to other disciplines, and includes examples of good research that serve as models for other researchers.

2. LITERATURE REVIEW

Design research is scientific inquiry related to the work of designers. Research in design for traditional societies focused primarily on historically derived principles of design. Until recently, design research contained references primarily to historically derived principles of design, such as style and genre. It has less certainty, regardless of time horizons, about how present design will shape the future reality. Design research has only secondarily concerned itself with the emergent meanings that consumers attach to different products or to the use contexts in which they use them (Lloyd Jones, 1991; Margolin, 1995). Research in design for the industrial society has fond that incurs a black-and-white dichotomy according to direction of sympathies. Thus, design research generally views designers as mediators between supply (i.e. producers) versus demand (i.e. users).
When design made the transformation from the traditional to the industrial society, there was certainty only about how the recent past has been shaped by the design distant in time. Just like them, design form the post-industrial information society must build on design for the industrial society.

In design research for the industrial society, there have been two schools of thought. One perspective has considered the role of consumer households to be one of an adaptable user and passive recipient. This can be called technology-based design research or "technology research". Another perspective acknowledges that households have an essential influence on how shaping the use of technology. This can be called consumption-based design research or "consumption research".

2.1. Technology-based supply of tools

Many popular technology-based scenarios of the everyday life perceive technology as an agent of change and a source of progress in modern society. Technology research, as its name suggests, borrows from research in innovation and technology. The argument is that producers develop tools, while users passively adapt to these tools. The view of human beings is primarily task-oriented and only secondarily experience-oriented (Pantzar, 1994, 1998). Technology presumably develops as a one-way process from the designer's desk into the hands of the user. The assumption is that all producers and all users adapt new technology to raise productivity. Information technology in the home, for example, necessarily follows developments in the office environment (Dholakia etc., 1996; Burgelman, 1996; Silverstone, 1996). The goal in the office environment was high demand. High demand distributed costs over a larger volume. Critical mass enabled lowering prices that, in turn, produced larger critical mass. The conclusion has been that producers ought to stick to innovations that consumers understand to a degree to which they can pay attention. With attention, it is possible to arouse interest; with interest, it is possible to promote a purchase decision; and with a decision to purchase, actual consumer purchases can result. Literature euphemistically discusses how "producers customize machines that learn to the user's preferences". In other words, machines are capable of learning in interaction, while consumers are not. Education and experience with the right kind of use get users to affix products with the right kind of cultural meanings (see Norman, 1988, 1993).

Recently, technology-based design research has also included an interest in what individual users and households really do, as opposed to what they are assumed they be doing (Dutton, 1996). One of the findings of this kind of research is that it is extremely difficult for novelties to break into and form a permanent part of everyday routines (Pantzar, 1996). Households are complex technological systems, the balance and functionality of which too radical designs upset. Users domesticated each successful invention in the past in a particular technological context. Thus, the information superhighway, for example, may be about as fascinating from the user's viewpoint as an ordinary superhighway, as long as the technical functions of the highway remain unclear for the user. However, this criticism has used mainly technical vocabulary to criticize such things as the computerization of households. It has fixed products with deterministic technological and social outcomes and framed the problem as a failure to teach households technical language. Thus, these critics still believe in technology-based scenarios as did Thomas Alva Edison who in this time
strictly condemned the use of moving pictures and gramophone records as entertainment. Edison could of course not be aware of the modern requirements of the end users. He simply assumed that, across diverse product categories, technology pushes in a linear process, while consumers adapt as their capabilities to understand the technologies reach a necessary standard.

Punctuated equilibrium studies (Anderson, Tushman, 1986) have shown technology has autopoetic or self-correcting qualities. However, studies of innovation and learning have shown that self-correction functions more at the system level than at the level of individual producers and users (March, 1991). These tend to lock themselves into paths that may be opposite from the perspectives of both their own optimal success and the wellbeing of consumers (Levinthal, March, 1993). The single exception may be producers of component-driven products such as machine tools (see Fujimoto, 1991, Ainamo, 1999). The design of the central machinery component normally drives the design and development of the other components, which support the central component. In component-driven products, producers have some grounds to consider product concepts and product-user interfaces unproblematic user experiences. In contrast to technology, consumption research, as its name suggests, borrows from marketing and consumption research.

2.2. Consumption-based creation of meanings

Consumption research does not believe in extending historically derived research findings into the future. This kind of research does not consider technological and social outcomes deterministic. Instead, the premise is that users in households actively associate certain meanings on the products they use. Consumers and their various preferences have a decisive effect on the direction in which technology eventually develops. Future consumers are not a market waiting for products, but rather producers and consumers jointly construct the future consumer, needs and market on the basis of their expectations and actions. Only use reveals a new technology's true potential (Gershuny, 1992; Pantzar, 1996, 1998; Rosenberg, 1994). Consumption research points out that Edison, for example, could not have known how ultimately the products of the office-related information society have invaded our homes. As late as the early 1980s, the information society existed only in the office environment. The question is not about consumer education to spread it to consumer households. The need is to direct more attention to the ways everyday lives of consumers supply products with new cultural meanings (Norman, 1988, 1993). Consumers are subjects and not merely objects. Innovative consumers define and determine the uses of new products, while more conservative consumers often imitate these definitions and uses.

Some researchers have found that consumers typically see technology as "text". Innovative consumers form a "script" (see Ackrich, 1992, 1995; Pantzar, 1997) they fix to a new product. This impacts on the final script that the product receives across users. Each finalized script is a manuscript of correct use that leads to its particular "user configuration" (Woolgar 1994,1996). The configuration acts as a "given" for further users and ways of use and, ultimately, leads to institutionalized meanings and "cultural values" (Branzi 1987). Consumption researchers have coined this system with many terms. These include the "experience economy" (Pine, Gilmore, 1998) and "supermarket society" (Schulze, 1995). "Open objects"
(Orfel, 1995) and "product milieus" (Margolin, 1995) "socially construct users" (Bardini, 1995; Pinch, Bijker, 1987). "Symbol intensive organizations" (Leikola, Wood, 1998) "appropriates" (Silverstone, 1996) meanings that users create. However, so far consumption research has paid insufficient attention to individual uses and the structural capacity to accept novelty products (Wells, 1993). In other words, there has been little consideration of end users' behaviour when this has remained independent of actual purchases. There are few studies about high-definition television or the pan-European television channel, for example, which were launched with high hopes but failed.

Fortunately, there are some important exceptions. Berg (1996) found that household investment behavior in interactive "smart phones" was different from that of the office. The emphasis was on institutional and social innovations that enable consumers to find new products places in everyday lives, usually as part of some sort of amusement.

3. THE PARADIGM FOR DESIGN FOR THE INFORMATION SOCIETY

The paradigm for design for the "information-society-based" includes at least three parts. Firstly, the paradigm includes the consideration of both consumers and producers, as well as the disciplines with which they link (marketing and engineering). Many of the insights from technology forecasts have failed but we know that of much of the research is nonetheless worthwhile (e.g. Rosenberg, 1994). Technology is not omnipotent. It is applicable only for truly technical products, such as component-driven products. In the case of most other products, design research has paid too little attention to the consumer-producers interface, represented in business firms by product development and marketing functions, respectively (Mackay, Gillespie, 1992). Design cannot passively to its progress. Creating a user need and a product market are as important in the process of domestication of technology as is technical inventiveness from the producer's point of few. The consideration of neither can be omitted. Consideration of technical considerations, for example, is possible for only products that are technically so simple so as to enable the omission of technical considerations, such as household commodities.

Secondly, there are the pertinent levels of analysis. At the level of production and consumption, producers integrate users already at a very early stage into the product development process. Designers have visions of the product-user interfact, on the basis of which they try to shape and control technology (Tepper, 1996). They usher the imaginary of the users into the product development of the firm. In other words, designers merge their intentions with those of the producer for which they work. "We know there is no need for any of this (i.e. new products), the job is to create the need, so that we have the reason to make the products - and sell them" (Butchenson, 1998). Thus, control takes in large part place only after the fact, not before. At the level of complex production and consumption systems, there are generally negative and positive externalities. Negative externalities were typical of the industrial era, when factories polluted. Positive externalities are typical of the information society (Evans, Wurster, 1997). In the industrial era there was a tradeoff between complexity of the product offering and the amount of people to which it could offer the product. In the information technology, there are almost zero marginal costs. There is also little industrial pollution. Instead, positive externalities have increasing returns to scale (Gates, 1996).
the information society are already evident in many examples of good research. Studies of producers and consumers highlight the "role of active experimenters" (Orfel, 1995), "users as collaborators" (Margolin, 1995), "users as producers (Wickstrom, 1996), "coproducers" (Wikstrom, 1996) or "collaborators" (Margolin, 1995). Studies at the system level highlight "contextual design" (Beyer, Holzblatt, 1998) and "constructive technology assessment" (Rip, Misa, Schot, 1995).

4. FURTHER RESEARCH

The information society will make designers of not only all professions but also of nonprofessionals, such as consumers. New technologies - eg. interactive games, motion based simulators -vigorously encourage whole new genres of experience. The information society will be one of dreams and story-telling (Jensen, 1995) with each consumer reading and understanding technologies in his or her own way (Woolgar,1996). Companies such as Intel, Phillips, L.M. Ericsson or Siemens actively engage themselves in the consumers' pursuit of new experience. "So to stay in rhythm, Intel must create new uses and new users -which is in fact the company's slogan for keeping the market in sync with its own pace" (Eisenhardt, Brown, 1998, 65). Within this context, the mission of design research is to understand the process by which professional designers build scenarios and conceptualize products, as well as to develop tools to aid them as they do so.

There are many points where design research will necessarily touch not only on marketing and engineering but also on other disciplines. Design research will need to understand the continuous evolution and complex historically derived technologically system, as well as emergent purchase decisions that consumers are already making. It may face negative issues of user configuration as some producers that sell virtual experiences systemtically collect and register data and misuse confidential data. However, many of the above problems concern technology policy, consumer behaviour, legislation and regulation, rather than design research. Design research must restrict its domain in order to be a true discipline. Relatedly, it must confidently welcome necessary contributions from other disciplines. Design research cannot alone grasp the implications of the wide network of actors and complex dynamics of interaction by limiting itself to a narrow and closed discipline.

Already as it stands, the paradigm opens a vast amount of topics for future research. These gyrate around user-centered interfaces in between other product development disciplines on the supply side, and consumers and other users on the demand side. With the recent spread of home offices and distance working, the operationalization of the differences between consumer households and producers is no trivial matter. The way design researchers this is done will shape the research process and findings. Particular kinds of operationalization will ultimately create more than one school of design research for the information society. The object and subject of research - user-centered third-wave homes and technologies - do not exist elsewhere but in the designers' heads. Truly information-society design research will accentuate making the visions explicit in order to solidify itself as a true science. It will gain full scientific status, progressing alongside innovation and technology research at one side, and marketing and consumption research on the other side. This positioning creates and widens the gap to tacit design for the traditional society.


Burgelman, 1996; Garnham, 1996; Winner, 1996.