

Design, Meanings, and Radical Innovation: A Metamodel and a Research Agenda*

Roberto Verganti

Recent studies on design management have helped us to better comprehend how companies can apply design to get closer to users and to better understand their needs; this is an approach usually referred to as user-centered design. Yet analysis of design-intensive manufacturers such as Alessi, Artemide, and other leading Italian firms shows that their innovation process hardly starts from a close observation of user needs and requirements. Rather, they follow a different strategy called design-driven innovation in this paper. This strategy aims at radically change the emotional and symbolic content of products (i.e., their meanings and languages) through a deep understanding of broader changes in society, culture, and technology. Rather than being pulled by user requirements, design-driven innovation is pushed by a firm's vision about possible new product meanings and languages that could diffuse in society. Design-driven innovation, which plays such a crucial role in the innovation strategy of design intensive firms, has still remained largely unexplored. This paper aims at providing a possible direction to fill this empty spot in innovation management literature. In particular, first it proposes a metamodel for investigating design-driven innovation in which a manufacturer's ability to understand, anticipate, and influence emergence of new product meanings is built by relying on external interpreters (e.g., designers, firms in other industries, suppliers, schools, artists, the media) that share its same problem: to understand the evolution of sociocultural models and to propose new visions and meanings. Managing design-driven innovation therefore implies managing the interaction with these interpreters to access, share, and internalize knowledge on product languages and to influence shifts in sociocultural models. Second, the paper proposes a possible direction to scientifically investigate the management of this networked and collective research process. In particular, it shows that the process of creating breakthrough innovations of meanings partially mirrors the process of creating breakthrough technological innovations. Studies of design-driven innovation may therefore benefit significantly from the existing body of theories in the field of technology management. The analysis of the analogies between these two types of radical innovations (i.e., meanings and technologies) allows a research agenda to be set for exploration of design-driven innovation, a relevant as well as underinvestigated phenomenon.

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Introduction

Design has recently gained much attention among practitioners and scholars. Firms are increasingly investing in design and involving design firms in their innovation processes (Nussbaum, 2004). Academic journals are publishing articles that explore the contribution of design to product development and business performance (Gemser and Leenders, 2001; Hertenstein, Platt, and Veryzer, 2005; Platt, Hertenstein, and Brown, 2001). The *Journal of Product Innovation Management (JPIM)*, for example, recently devoted two special issues (Vol. 22, January 2005 and March 2005) to the relationship between design and product innovation (and in particular to the interactions between marketing and design). These seminal contributions have started to give a more grounded theoretical basis to the field of design management, which was almost completely uncovered by scientific research. Yet this is only a starting point of a long research path whose major puzzles still remain to be solved.

Significant efforts in this recent literature have been concentrated into investigating a specific approach to design, usually referred to as *user-centered design* (see, e.g., Chayutshakij and Poggenpohl, 2002; Veryzer and Borja de Mozota, 2005; Vredenburg, Isensee, and Righi, 2002). This approach, in the spotlight thanks to the successes of major design firms such as IDEO (Kelley, 2001) or Continuum (Lojacono and Zaccai, 2004), implies that product development should start from a deep analysis of user needs. Its assumption is that a firm may infer unique insights to inform product innovation by asking users about their needs or, more effectively, by observing them as they use exist-

ing products and by tracking their behavior in consumption processes. The growth of interest on applied ethnographic research (i.e., the practice of observing users in the context of use) is a signal and a direct consequence of this approach. Investigation of user-centered design and analysis of its success cases have helped to surpass the classic and common interpretation of design as style (i.e., as “something to make products look better”) that comes from the unspoken intuition of an individual designer. These studies provide a deeper and more valuable interpretation of design as an organizational process, a process to get closer to users and their actual needs. And indeed, models of user-centered design processes, with proper steps and tools, have been proposed (Kumar and Whitney, 2003; Patnaik and Becker, 1999). Models that effectively combine on the one hand methods to better understand customer needs (e.g., ethnographic research and its variations; see, e.g., Rosenthal and Capper, 2006) and on the other hand guidelines on how to improve creative skills (Sutton, 2001).

No one questions the importance of user-centered design. Yet this is only one piece of the puzzle. There are indeed firms that have effectively developed a different approach to rely on design, an approach that does not fit the user-centered model and, to a large extent, is orthogonal to it. This approach, called herein *design-driven innovation*, is practiced at its most sophisticated and advanced level by successful Italian manufacturers, such as Alessi, Artemide, and Kartell, and allows them to be worldwide leaders in their industry, notwithstanding their small size and limited resources. The innovation process of these Italian companies in furniture, kitchenware, lighting, and small appliance industries (as well as other worldwide leaders in different industries such as Apple or Bang & Olufsen), is definitely not user centered. Rather, these companies have developed superior capability to propose innovations that radically redefine what a product means for a customer. For them, design-driven innovation is the radical innovation of a product’s meaning. An (extreme) example is the well-known Alessi product line called “family follows fiction.” In 1991 Alessi created playful, colorful, and metaphoric kitchenware, with corkscrews shaped like dancing women or parrots and orange squeezers shaped like Chinese mandarins. Although today this type of symbolic objects is quite imitated, before the 1990s no one would have ever thought that people would love to have “dancing” corkscrews. This was a breakthrough change in what kitchenware meant for people: from

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simple kitchen tools to “transitional objects” (i.e., objects of affections that talk directly to the child that is still living inside each adult). When creating the “family follows fiction” product line, Alessi was inspired by theories of pediatrician and psychoanalyst David Winnicott on transitional objects, of psychoanalyst Franco Fornari on affective codes, and of Jean Baudrillard on object systems. Winnicott in particular focused on the role that objects have in the psychological development of children, who associate feelings and meanings to their daily objects. He investigated the role of transitional objects (i.e., objects with high symbolic meaning) that help children in the transition from being fed from their mother to a more autonomous psychological status and that become almost indispensable in their life regardless to their function (e.g., the well-known Linus security blanket). Winnicott showed that adults still have transitional objects (although not blankets or toys!).

Design-driven innovation does not start from users’ insights. People definitely did not ask for Chinese-like orange squeezers before 1991. But they loved Alessi’s products after they saw them. Indeed, customers hardly help in anticipating possible radical changes in product meanings. The sociocultural context in which they are currently immersed makes them inclined to interpretations that are in line with what is happening today. Radical changes in meanings instead ask for radical changes in sociocultural models, and this is something that might be understood (and affected) only by looking at long-term phenomena with a broader perspective. Design-driven innovation is therefore pushed by a firm’s vision about possible breakthrough meanings and product languages that could emerge in the future. As this vision cannot be developed solely by looking at current user behaviors, the process of these firms has little in common with user-centered approaches.

Purpose of the Article

A theory seems to be missing that would explain why and how leading firms such as Alessi, Artemide, Apple, or Bang & Olufsen that have brought design at the heart of their business model are so successful without being user centered. The strong focus of recent literature on user-centered design has left a major empty spot in theory of product innovation management. How are breakthrough innovations driven by design created? And this is a relevant matter, as break-

through innovations of meanings are usually associated not only to higher profits on product sales but also to stronger brand value, as the cases of the firms previously cited show clearly.

One of the reasons explaining why design-driven innovation has largely remained unexplored is that its processes are hard to detect when one applies the typical methods of scientific investigation in product development, such as analyses of phases, organizational structures, or problem-solving tools (Brown and Eisenhardt, 1995; Shane and Ulrich, 2004). Unlike user-centered processes, design-driven innovation is hardly based on formal roles and methods as ethnographic research. We therefore need new lenses to activate a stream of studies on this relevant and unsolved matter and to improve our capability of understanding how breakthrough innovation led by design occurs.

The purpose of this paper is to suggest a research strategy for investigating design-driven innovation. Starting with the analysis of successful Italian manufacturers, the study proposes a metamodel in which design-driven innovation is the result of a networked research process, where knowledge on languages and meanings is shared among firms and external interpreters. This metamodel allows analogies to be highlighted between design-driven processes (which lead to breakthrough innovations of meanings) and technology push processes (which lead to breakthrough innovations of technologies). In other words, design-driven innovation partially mirrors networked research processes on technologies, with the major difference that the latter deal with technological knowledge instead that with knowledge on languages and meanings.

Hence, after having described the similarities among the two processes (design driven and technology push innovation), the present study sets a research agenda by showing how the investigation of design-driven innovation may benefit from the application of theories already developed for the investigation of technology management (if properly adapted).

Summarizing, the purpose of the present study is (1) to propose a metamodel that explains the basic mechanisms underpinning the management of design-driven innovation (i.e., the radical innovation of product meanings); (2) to discuss, thanks to this metamodel, analogies between design-driven innovation and existing theories on radical innovation of technologies; and (3) to show how theories on technology management (for which there is a significant and

consolidated body of knowledge) can therefore be relied upon to investigate the management of radical innovation of meanings.

The aim of this paper therefore is not to provide a final answer to the puzzle of design-driven innovation (as it presents a metamodel) but rather to propose new lenses to activate a stream of research on this phenomenon for which scholars hardly have a theory. Introducing a metamodel provides a way not to start from scratch. In particular, its link with theory on management of (technological) innovation allows decades of research to be averaged, with its theories and empirical methodologies.

Although this study is theoretical in nature, its insights are significantly based on empirical analysis. In the past 10 years, we were involved in comprehensive investigation of design-driven practices in several firms in different industries, with a special focus on Italian manufacturers—that is, manufacturers that push radical innovation of meanings at its extreme—with significant and worldwide acclaimed success.

The most significant contribution comes from our participation in the research project *Sistema Design Italia* (“Italian design system”). This €1.5 million project, funded by the Italian Ministry of University and Research and coordinated by Politecnico di Milano, involved 17 research teams in Italy and developed 74 case studies of successful product innovations in several different industries. The work received the *Compasso d’oro* 2001, the most prestigious design award in Italy. Our contribution in the project was to provide methodology and interpretation on design management practices. After the project was over, we further enriched our understanding of design-driven innovation by investigating other cases in other countries (e.g., France, Denmark, Germany, the Netherlands, United States).

Sistema Design Italia was the first ever research study on management practices in Italian design. Many studies had already illustrated the peculiar achievements of Italian design (especially in industries such as furniture, lighting, kitchenware, and appliances). However, those studies mainly focused on Italian designs (e.g., on products that appear in major museums of modern art worldwide) or on Italian designers. Some macroeconomic investigations also tried to explain the success of Italian design in light of contextual factors, such as the following:

- A strong tradition in arts and crafts (MOMA, 1972).
- Young architects in the 1950s and 1960s who, in face of a lack of policies for large infrastructural projects, dedicated their intellectual energies to products instead of buildings (Branzi, 1999).
- An industrial base consisting of small and flexible enterprises (the industrial districts; Piore and Sabel, 1984).
- An advanced culture in consuming products with significant symbolic and visual content, which makes local customers demanding and the local market highly stimulating for design-driven innovation (Gelant, 1994).

All these theories indeed partially contribute to explain the success of Italian design, yet this success also has a significant managerial rationale. Indeed, one could notice that most Italian designs are not created by Italian designers but by foreign designers who work for Italian firms. Italian manufacturers have a special ability to attract talented designers from all over the world, as testified by some of them (Verganti, 2006):

Northern Italy is the centre of the design world. Not just because of the design that comes from Italy, but, above all, because of its manufacturing culture; there is no other place in the world where you can find such a vast array of manufacturers who know the value of design.

—Ron Arad, Israeli architect and designer

In Italy you can find entrepreneurs who stimulate designers from all over the world to work for them.

—Karim Rashid, Egyptian designer

In Italy, when a project is presented to Claudio Luti of Kartell, to Enrico Astori of Driade, to Piero Gandini of Flos, to Umberto Cassina of Cassina, it is a real pleasure. They love the project, they love it with a passion. When a prototype is taken to Alberto Alessi he thinks it is Christmas, it is a splendid gift.

—Philippe Starck, French architect

These examples suggest that to find explanations for the success of Italian design one should also look into the management practices of manufacturers. Italian manufacturers are therefore an interesting and unique empirical ground to investigate the management of design-driven innovation.

The present paper is structured as follows. First, a framework is briefly introduced for interpreting the nature of design-driven innovation and its positioning on the map of innovation strategies of firms. Then,

starting from the analysis of successful Italian manufacturers, a metamodel is proposed to understand how design-driven innovation occurs and may be managed. Finally, on the basis of this metamodel analogies are shown with the process of creating breakthrough technological innovation and how the existing body of theories in this field can support investigation of radical innovations of meanings.

Design and Innovation Strategies

One of the reasons scientific investigation of design is a difficult challenge for scholars of innovation management is that the definition of *design* is fluid. Although there are several interpretations of design (for a comprehensive analysis, see Love, 2000), one common thread of these definitions is that they tend to be as broad as possible. Apart from Simon's (1982) general definition that "design is the process by which we [devise] courses of action aimed at changing existing situations into preferred ones" (see also Boland, 2004), this tendency also can be found in definitions more targeted to product design, starting from that proposed in 1961 by Thomas Maldonado (1991) for the International Council of Societies of Industrial Design, where design is seen as the process that coordinates all factors contributing to a product, from its consumption (functional, symbolic and cultural factors) to its production and distribution. A consequence of this attempt to make the concept general is that it also becomes generic, so that one can hardly distinguish its peculiarity with other fields of investigation, which, as underlined by Maldonado himself, slows down scientific progress in the field (Maldonado, 2000). Indeed, interpretations of design often tend to be very close to "product development" (albeit with a more user-centered focus, as supported by the studies on user-centered design previously cited; see also Walsh, 1996), and sometimes its interpretations are close to *market research* or *creativity* and even *branding* (DMJ, 1998). The consequence is when asked to really think about the peculiarity of design and about what really makes design different from other fields such as engineering, many people think about the product form, called *aesthetic and style*.

It is not the purpose of the present paper to enter into a debate that is authoritatively developed by design scholars. However, a precise and clear-cut definition is needed that would allow a connection to be created between design and other existing theories of

innovation management. And as differences are sought, the choice has been to adopt a definition that is somewhat narrower than what usually seen in management literature but that actually highlights the peculiarity of design compared with other innovation fields. Following the approach of many design theorists, the present study's approach is that design deals with the meanings that people give to products and with the messages and product languages that one can devise to convey that meaning. In other words, the present study adopts the definition proposed by Klaus Krippendorff (1989) in *Design Issues*: "The etymology of design goes back to the latin *de + signare* and means making something, distinguishing it by a sign, giving it significance, designating its relation to other things, owners, users or gods. Based on this original meaning, one could say: *design is making sense (of things)*." This statement reflects the archaic definition of the word *design* reported in dictionaries, where design means "to indicate with a distinctive mark, sign or name" (*Merriam-Webster's Collegiate Dictionary*, 1993). The product style (considered as its mere aesthetic appearance) is but one of many ways a product may bring messages to the user. Apart from styling, what matters to the user, in addition to the functionality of a product, is its emotional and symbolic value (i.e., its meaning). If functionality aims at satisfying the utilitarian needs of customers, the product meaning tickles their affective and sociocultural needs. Meaning proposes to users a system of values—a personality and identity—that may easily go beyond style. Designers give meaning to products by using a specific design *language*—that is, the set of signs, symbols, and icons (of which style is just an example) that delivers the message.

The semantic dimension of design has also been actually recognized and underlined by several design scholars and theorists (Bayazit, 2004; Cooper and Press, 1995; Friedman, 2003; Heskett, 1990; Karjalainen, 2003; Lloyd and Snelders, 2003; Margolin and Buchanan, 1995; Norman, 2004; Petroski, 1996; Redstrom, 2006). Research in marketing, consumer behavior, and anthropology of consumption has also demonstrated that the affective/emotional and symbolic/sociocultural dimension of consumption is as important as the utilitarian perspective of classic economic models, even for industrial clients (Bhat and Reddy, 1998; Brown, 1995; Csikszentmihalyi and Rochberg-Halton, 1981; Douglas and Isherwood, 1980; Du Gay, 1997; Fournier, 1991; Holt, 1997, 2003; Kleine, Kleine, and Kernan, 1993; Mano and

Oliver, 1993; Oppenheimer, 2005; Pham et al., 2001; Schmitt, 1999; Sheth, Newman, and Gross, 1991; Shupe, 2005).

This definition allows design to be linked more precisely with other theories of innovation (Garcia and Calantone, 2002) and its peculiar nature to be better pointed out. Consider in particular the diagram in Figure 1. Building on the aforementioned discussion it can be said that innovation may concern a product's functional utility, its meaning, or both. In addition, functional innovation may imply an incremental or radical improvement of technical performance; innovation of the semantic dimension may also be more or less radical. In particular, innovation of meanings is incremental when a product adopts a design language and delivers a message that is in line with the current evolution of sociocultural models. Users would probably perceive this product as “fashionable” and maybe stylish as it conforms to existing definitions of beauty (i.e., with a style that relies on accepted languages). However, innovation of meanings may also be radical, which happens when a product has a language and delivers a message that implies a significant reinterpretation of meanings.

For example, the Swatch, launched first in 1983, was a radical innovation of what a watch previously meant to people. As watches were considered to be jewels in the 1950s and 1960s and moved to be considered time instruments in the 1970s (with the advent of the Taiwanese quartz watch industry), the Swatch radically overturned the watch's meaning into that of fashion accessory—which is easy to see after it was

conceived. But before the Swatch, no one thought that watches could ever achieve that meaning (Glasmeier, 1991). The Swatch's design language, with its intensive use of plastic, colorful style and low price, helped to convey this new meaning. Nowadays Swatch launches a couple of new collections into the market every year. Each collection consists of style and graphic changes that simply adapt its original meaning to evolutions in sociocultural trends. Every Swatch collection may therefore be interpreted as an incremental innovation of meanings.

Another well-known example of radical innovations of meanings is the previously mentioned Alessi's Family Follows Fiction products (which turned kitchenware from being simply functional into symbolic objects of irony and affection). In addition, Bang & Olufsen's Beosound 4000 stereo released in 1972 transformed music players from electronic devices into pieces of furniture—an overturn of meanings so radical that not even GE grasped it when Jacob Jensen presented them its first prototype before moving to Bang & Olufsen (Jensen, 2005). Or consider the Apple iPod, whose success, largely acknowledged and debated, is not simply due to its stylish form; indeed, before the iPod, there were already several other competing MP3 players with a much more stylish language in line with the dominant design language at that time (i.e., the language of the Sony Walkman). The iPod instead has proposed a radical new language and also, and above all, a radical new meaning that implies a new experience limited not simply to listening music but also to, for example, accessing music on the Web through the iTunes website, financially supporting the music industry, and organizing and accessing songs through novel interfaces.

The area in the right-hand side of Figure 1—where novelty of meaning and design language is radical—is called here design-driven innovation. Note that sometimes it is not immediate. It takes time to diffuse and achieve acclaimed success. Users indeed need to understand the radically new language and message, to find new connections to their sociocultural context, and to explore new symbolic values and patterns of interaction with the product. In other words, radical innovations of meaning solicit profound changes in sociocultural regimes in the same way as radical technological innovations, which solicit profound changes in technological regimes (Bijker and Law, 1994; Callon, 1991; Geels, 2004; Latour, 1987). This does not refer to “fashionable” or stylish products but rather to products that may contribute to the definition of

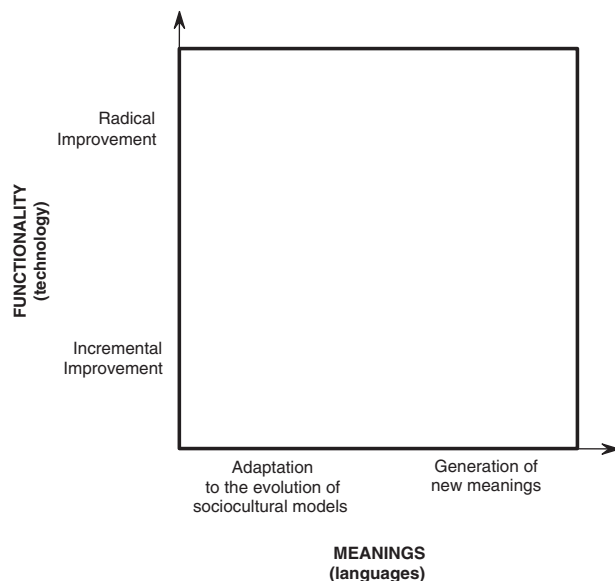


Figure 1. The Dimensions of Innovation (Verganti, 2008)

new aesthetic standards—possibly something that could become an icon in the future and definitely something that plays a major role in changing socio-cultural models. In other words, design-driven innovation may be considered as a manifestation of a *reconstructionist* (Kim and Mauborgne, 2004, 2005) or *social-constructionist* (Prahalad and Ramaswamy, 2000) view of the market, where the market is not “given” a priori (such as in the structural perspective; e.g., Porter, 1980) but is the result of an interaction between consumers and firms: Needs (i.e., not only utilitarian needs but also symbolic end emotional meanings) are therefore cocreated. Design-driven innovation is not an answer to, but a dialogue with and a modification of, the market.

Successful Italian manufacturers in design-intensive industries have demonstrated unique capabilities to master radical innovation of meanings. Their innovation portfolio consists of several incremental projects coupled with a few strategic (and often successful) attempts to introduce breakthrough changes of product meanings, which explore new routes, satisfy latent desires and aspirations, move the frontier of design languages, set new standards of interpretation, and eventually strengthen the brand value. Italian manufacturers therefore provide an interesting investigation ground to understand how design-driven innovation may occur.

Looking closely at these firms, we may easily discover that they hardly apply ethnographic and user-centered methodologies and tools in their innovation process. Rather, when asked about how their firms investigate users’ needs, entrepreneurs of leading design-driven companies have a variety of answers (Verganti, 2008):

Market? What market? We do not look at market needs. We make proposals to people.

—Ernesto Gismondi, chair, Artemide

Working within the metaproject transcends the creation of an object purely to satisfy a function and necessity. Each object represents a tendency, a proposal and an indication of progress which has a more cultural resonance.

—Alberto Alessi, chief executive officer (CEO), Alessi

A similar vision is shared by firms in other industries and countries following a similar strategy (Verganti, 2008):

The only time we did market research was with Beogram 4000 (in 1972). Marketing people said it would

have sold 15 units in Denmark and 50 in the world. It turned out to be one of our most successful products.

—Paul Ulrik Skifter, chief financial officer, Bang & Olufsen

These managers are saying that design-driven innovation does not start from users’ insights. And indeed, no one would seriously imagine that a user would ever explicitly ask for a dancing anthropomorphic corkscrew. Indeed, customers hardly help in understanding possible radical changes in product meanings. They are immersed in today’s sociocultural context, which shapes their interpretations toward current meanings (Gero and Kannengiess, 2004). Radical changes in meanings instead imply radical changes in sociocultural regimes, the directions and chances of which might be understood only by looking at long-term phenomena with a broader perspective. Even more interestingly, these managers are saying that their design-driven innovations are not answers to user needs but proposals. They explicitly recognize their action as possibly driving change in sociocultural regimes. Design-driven innovation is therefore a pushing innovation activity—a proposal of possible breakthrough meanings and product languages with a high chance of diffusion in future society.

Tracing back design-driven innovation to theories of innovation management, we may actually acknowledge that a similar perspective is shared by scholars of technology management. An intense debate took place in the 1970s about the direction of innovation processes (technology push versus market pull), culminating with the milestone contribution of Giovanni Dosi (1982), who suggested that any innovation implies understanding of both technologies and markets and that changes in technological paradigms (i.e., radical technological innovations) are mainly technology push whereas incremental innovations within existing technological paradigms are mainly market pull. An approach shared also by more recent research on the relationship between disruptive innovations and user needs (Christensen, 1997; Christensen and Bower, 1996; Christensen and Rosenbloom, 1995; Dahlin and Behrens, 2005). Reading the present study’s previous analysis in light of this realm of investigations, it is recognized here how design-driven innovation is closer to technology push rather than to user-centered innovation. This is the first promising foundation for the purpose of this paper, which suggests the adoption and adaptation of theories on technology management to investigate design-driven innovation.

These considerations are mapped in Figure 2 on the dimensions of innovation, highlighting the major areas of action of the three modes of innovation:

- Design-driven innovation, where innovation starts from the comprehension of subtle and unspoken dynamics in sociocultural models and results in proposing radically new meanings and languages that often imply a change in sociocultural regimes.
- Market-pull innovation, where innovation starts from the analysis of user needs and subsequently searches for the technologies and languages that can actually satisfy them. User-centered innovation is included here as a declination of market-pull innovation, as both start from users to directly or indirectly identify directions for innovation. Although the user-centered approach is more advanced and sophisticated since its methodologies allow to better understand why and how people give meaning to existing things, which can lead to more innovative concepts compared with traditional market-pull processes, it still operates within existing sociocultural regimes.
- Technology-push innovation, which is the result of dynamics of technological research. The overlap between technology push and design-driven innovation in the upper left corner of Figure 2 highlights that breakthrough technological changes are often associated with radical changes in product meanings—in other words, shifts in technological paradigms are often coupled with shifts in sociocultural regimes (see Geels, 2004 for a very insightful analysis). For example, the introduction of quartz watches in the 1970s was both a breakthrough change in technologies (the introduction of semiconductors) and in meanings (watches moved from being jewels to being instruments—some even had a small calculator as an additional feature). And, vice versa, radical innovations of meanings are often prompted by the availability or exploration of new technologies.

As already underlined by the debate on technology-push versus market-pull innovation, the present paper does not claim that one of these modes of innovation is unaware of the others. As successful technology-push innovation requires a deep understanding of market dynamics, design-driven innovation also implies analyzing user needs, observing them, and exploring new technologies. There is a bit of each in any type of successful project. What is different, however, is the driver, the starting point, as the aforemen-

tioned quotes by Gismondi, Alessi, and Skifter clearly point out.

The Metamodel: Design-Driven Innovation as a Networked Research Process

Having defined design-driven innovation and identified its specificities compared with other innovation strategies, a metamodel can now be built to better understand how this type of innovation can be successfully managed. And this paper's perspective is totally managerial. The intention here is not to interpret how meanings change in society or how designers can creatively grasp those changes and incorporate them into their designs. Instead, this study is concerned with how firms, and in particular their managers, can implement a process to successfully realize design-driven innovations.

This metamodel is generated by starting again with the investigation of Italian manufacturers (Verganti, 2003, 2006). Indeed, the radical innovations of meanings “proposed” by Italian manufacturers are not dreams without a foundation, nor they are simply the results of a sudden sparkle of creativity of clever designers—these studies dealt with great and repeated business successes and of leading firms in the global arena, notwithstanding their very small size. How did these companies manage to make radically innovative proposals that were also profitable? How did they create breakthrough messages that eventually emerged as the messages that (some) users were implicitly looking for?

To manage design-driven innovation, Italian manufacturers have developed a significant capability to understand, anticipate, propose, and influence the emergence of new product meanings. The process through which these manufacturers develop knowledge about possible future sociocultural evolutions and formulate new product meanings is hard to track. Indeed, knowledge about the subtle and unexpressed dynamics of sociocultural models is tacit; it is not codified in books or in sociological scenarios of the future (which usually describe extrapolations of current phenomena, whereas design-driven innovation assumes a modification of the scenario by means of the firm's proposal). Further, this knowledge is distributed. The shaping of sociocultural models and their impact on the interpretation of product languages depend on millions of unpredictable interactions among, for example, users, firms, designers,

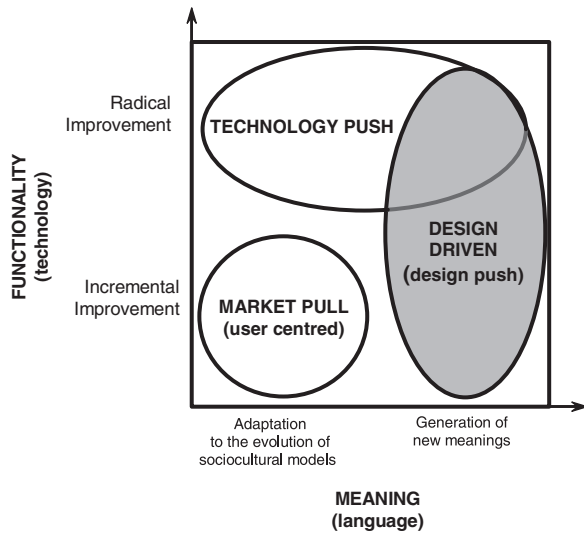


Figure 2. Innovation Strategies (Verganti, 2008)

products, communication media, cultural centers, schools, and artists as studies on production of culture have shown (see, e.g., Peterson and Anand, 2004).

Italian manufacturers have recognized that their firms are immersed in this distributed network of actors who explore future meanings and influence, with their actions, the creation of new cultural models (Figure 3). And these manufacturers have recognized that most of these actors share their same problem: to understand the evolution of sociocultural models and to propose new visions and meanings.

Consider, for example Artemide, a high-end lamp manufacturer, that has created several radical innovations of meanings. An example is Artemide Meta-

morfofi, a lamp that produces colored atmospheres controlled by a computer. With *Metamorfofi*, Artemide has radically redefined what people search for in a (high-end) lamp: from having a beautiful object in their living room to having a customized light that makes them feel better in their domestic environment according to their own emotions. When trying to create new languages and meanings for their lamps, Artemide's investigation is not limited simply to lamps and their functionality but takes a broader perspective to understand the aspirations of people when living in their home (i.e., possible future domestic mindsets, actions, and meanings) to be addressed by new proposals of lamps. Artemide is surrounded by several other actors who share its same problem (i.e., understanding of future domestic mindsets and lifestyles), including the following:

1. Firms in other industries addressing the same user person in the same domestic context (e.g., manufacturers of furniture, small appliances, TV sets and stereos, broadcasting firms) that are similarly willing to understand what people could want to experience in their domestic life.
2. Product designers, who have their own vision and language about domestic lifestyle, a vision developed by working with several different firms in the industry.
3. Architects, who design houses and living spaces.
4. Magazines and other media of interior design, which often develop domestic scenarios.
5. Suppliers of raw materials (e.g., Bayer or 3M), which are interested in seeing possible future use of their new materials in household products).

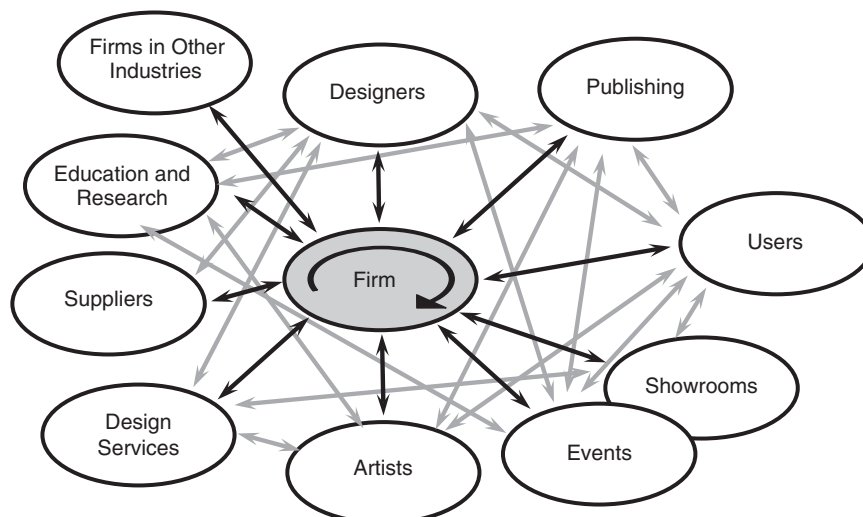


Figure 3. The Design Discourse Surrounding a Firm (Verganti, 2008)

6. Universities and design schools, where professors and students often conduct workshops to design domestic products.
7. Showroom and exhibition designers, which explore new organizations of spaces.
8. Artists, who are recognized as “symbolic creators” (e.g., Hesmondhalgh, 2002) and whose pieces eventually often appear in houses.

All these actors are interested in understanding possible future domestic scenarios and all carry on, through their own processes and approaches, research into these scenarios, therefore developing knowledge about future sociocultural models. This happens not only with their actions and outputs (e.g., products, projects, reports, artworks, shows) but also with their contributions to influencing what people will actually think and love when living in their homes. Interacting with these actors therefore increases Artemide’s capability to understand and influence sociocultural models and therefore increases its probability of developing radical innovations of meanings that in the future would be highly successful in the market place.

Italian manufacturers highly value their interaction with this network of actors. They consider these actors as interpreters of the evolution of future scenarios with whom to share their own visions, to exchange information on trends, and to test the robustness of their assumptions. What these manufacturers have understood is that knowledge about sociocultural models is diffused within their external environment and that they are immersed into a huge research laboratory, where designers, firms, artists, and schools make their own investigations and interactions. It is also understood that these interpreters are “seducers,” since with their interaction they shape sociocultural models and influence the meanings, aspirations, and desires of people and users.

This networked laboratory is called herein the *design discourse*. This is a collective research process on meanings and design languages (i.e., a continuous dialogue on sociocultural models, foreseen and desired) and its implications on patterns of consumption and product languages, occurring through several explicit and tacit interactions among several actors both in the global and local setting.

Italian manufacturers recognize that an important part of their competitive advantage is built on their capability to access and influence the design discourse as a crucial carrier toward their users. Their capability to create radical innovations of meanings is therefore based on a research process that rely on interpreters in the design discourse, including lead users, of course, but also and above all firms in other industries, artists, media, architects, cultural centers, designers, schools and universities, and exhibitions.

This process significantly differs from user-centered design, both in nature and players (Figure 4). In particular, its basic characteristics are as follows:

- It is a networked research process.
- It spans widely outside the boundaries of the firm, including users, but also and mainly several other interpreters.
- It is based on sharing of knowledge (about sociocultural models, meanings, and product languages).
- It includes an action of influencing and modifying (through the interpreters themselves and their influencing and seductive power) the sociocultural regime.

Whereas the key capability in user-centered design is to get as close as possible to users, to elicit their needs, and to be creative in finding solutions, the key capability in design-driven innovation is to access and to share knowledge with the design discourse and, more precisely, to identify the key interpreters, to

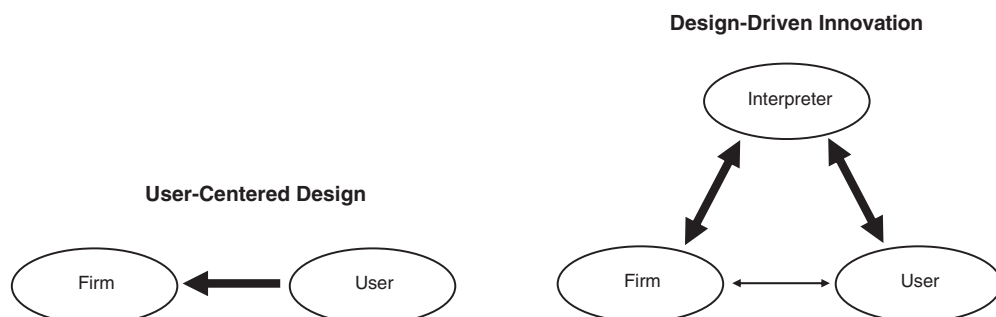


Figure 4. User-Centered Design and Design-Driven Innovation (Verganti, 2008)

attract them and develop with them a privileged relationship, to share and recombine knowledge to build unique proposals, and to rely on the design discourse to communicate with users.

This metamodel is the second premise for our research agenda on design management. This is not only because it provides a better understanding of how breakthrough innovation led by design occurs and can be managed but also, and above all, because it allows design-driven innovation to be connected with existing theories of technology management that have already dealt with similar problems: how to achieve breakthrough (technological) innovations; how to manage networked research processes; how to share (technological) knowledge with external partners; and how to influence the modification of (technological) regimes. The next section discusses this parallel between management of design-driven innovation and management of breakthrough technological innovation to suggest possible directions for the research agenda on design management.

The Research Agenda: Investigating Design by Relying on Theories of Technology Management

The previous section discussed how design-driven innovation—that is, the radical innovation of product meanings and languages—may occur by managing a networked research process. This process implies knowledge exchange with the design discourse. Firms need to identify interpreters who share its interest of understanding and influencing the evolution of sociocultural models and design languages in a given context of use.

This process has hardly been investigated in design management literature, which has been mainly focused on cross-functional teamwork, user-centered processes, creative methods, and concept generation and product development. The present study's metamodel moves the attention from cross-functional processes occurring within a firm to networked processes that occur mostly outside a firm, from users needs to sociocultural models, from tools and methods to knowledge, from development to research. Therefore, a new theory is necessary.

To build this new theory, this section shows how instead of starting from scratch, much profit can be gained from a field that has already investigated a similar problem, albeit applied to a different type of

knowledge and innovation: technology and functionality instead of languages and meanings. This field is technology management, and in particular those theories that have investigated the management of radical technological innovation. The purpose of this section is specifically to show how processes and concepts in design-driven innovation and radical technological innovation somewhat mirror each other and, ultimately, to suggest and stimulate a direction of research on design-driven innovation that can rely on decades of research on technology management, if adapted to this peculiar problem.

Table 1 summarizes the present discussion. The left column lists concepts that, according to research illustrated in the previous section of this paper (and further elaborated on in Verganti, 2003, 2006), play a major role in the development of design-driven innovations. The right column highlights how these concepts are mirrored in theories of technology management. Before illustrating each single concept and connection, clarification for the criteria that have inspired the present analysis is given.

First, the scope of analysis is management of innovation and in particular concerns the relationship between design management and theories of technology management. This has two important implications. The first implication is that the focus here is on management issues—not on how sociocultural models evolve; on how the world of cultural production may affect them; on how signs, languages, and symbolic elements are shaped and diffuse in society. These issues are object of analysis in fields that usually do not adopt a managerial perspective, such as cultural anthropology, cognitive sciences, semiology, sociology of culture, and especially production of culture (Becker, 1974, 1982; Du Gay, 1997; Peterson and Anand, 2004). In these fields parallels and confirmations also could be found of this paper's metamodels: For example, scholars of production of culture speak of symbolic creators (Hesmondhalgh, 2002) or of cultural intermediaries (Hirsch, 1972) instead of interpreters, or they speak of circles (Kadushin, 1976) instead of the design discourse. But these analogies do not help investigate the managerial practices of design-driven innovation. Rather, they may be more useful to investigate the sociological dynamics of design-driven innovation and may find a more direct connection with theories of sociology of science and technology (e.g., with Actor-Network Theory; Latour, 1987) rather than with management of technology. The second implication is that the present paper's

Table 1. Analogies between Management of Radical Innovation of Meanings and Management of Radical Innovation of Technology

Language and Meaning	Technology and Functionality
Design Driven Radical Innovation of Meanings and Languages)	Technology push (Dosi, 1982) Incumbents and disruptive innovation (Christensen, 1997; Christensen and Raynor, 2003)
Sociocultural Regimes	Technological regimes (Callon, 1991; Latour, 1987) Complementary assets (Teece, 1986)
Archetypes, Icons	Dominant Design (Utterback, 1994) Business Classics (Sanderson and Uzumeri, 1995)
Languages and Signs	Architectural and component innovation (Baldwin and Clark, 2000; Henderson and Clark, 1990; MacCormack et al., 2006)
Design Research	Technological research (Burgelman, Maidique, and Wheelwright, 2004) Resource-based innovation (Kogut and Zander, 1992) Knowledge generation, integration, and retention (Iansiti, 1997)
Design Discourse	Business ecosystems (Iansiti and Levien, 2004) Open innovation (Chesborough, 2003)
Key Interpreters	Alliances, trust, and cognitive distance (Granovetter, 1982; Nooteboom, 1999) Codesign and supplier involvement (Clark, 1989; Liker et al., 1995; Sobrero and Roberts, 2002)
Language Brokers	Gatekeepers (Allen, 1977) Technology brokers (Hargadon, 2003)
Immersion	Absorptive capacity (Cohen and Levinthal, 1990)

analogies are with management of technology. Indeed, whereas the investigation of design has been approached by a number of management disciplines, such as organization (Amabile, 1996; Boland and Collopy, 2004; Hargadon and Fanelli, 2002; Leonard-Barton and Swap, 1999) and marketing (in particular, cultural branding, which investigates how brand value may be created by understanding the evolution of cultural models in society; see, e.g., Holt, 1997, 2002,

2003), scholars of technology management have not traditionally applied their theories to design, but when they have, it has been within the framework of product development and concept generation (Shane and Ulrich, 2004; Walsh, 1996; Walsh et al., 1992). As design has often been related to styling or to user-centered innovation, and since its action of radical innovation of meanings has been overlooked, the attempts to investigate design as the result of a research process and to apply to it theories of managing breakthrough technological changes have been minor (for some early effort, see Verganti 2003, 2006; Utterback et al., 2006).

Second, our purpose here is to explore connections between concepts in management of radical innovation of meanings and concepts in management of radical innovation of technologies. In examining the concepts in Table 1 an in-depth discussion will not be provided of each theory listed in the right column of the table (for which readers are referred to the existing literature on technology management. It is worth noting that theory on technology management is evolving itself, and in many instances there is not a single model or view shared by all scholars on the field. There are, for example, different definitions and perspectives when looking at radical technological innovation or at innovation processes. The discussion of trends and different schools in this field, which would imply a much more detailed and dedicated analysis, goes well beyond the scope of this paper). In addition, this paper does not explain how these theories can be applied to design-driven innovation (left column of Table 1), as this application and adaptation are what the paper aims to stimulate with this discussion. Therefore, the present study shows how the concepts in the two columns are analogous, places investigation of design-driven innovation in the framework of theories of technology management, and then suggests possible research questions and models that can constitute a research agenda for design management.

Changes in Sociocultural Models, Disruptive Innovation of Meanings, and Incumbents

The first analogy between theories of technology management and design-driven innovation was introduced earlier in this paper. Design-driven innovation is a new radical proposal pushed into the market, with an approach that reminds the attitude and processes of breakthrough technological innovation.

One could therefore wonder whether the radical nature of design-driven innovation poses challenges to firms that are similar to the challenges of radical technological innovation. In particular, since the evolution of sociocultural models in society, like technological transitions, follows a pattern of incremental and radical changes, one can wonder whether radical change in society and culture may have a disruptive effect on leading incumbent firms—that is, firms that master a given trajectory of a design language. Do radical innovation of meanings pose significant challenges to incumbents, which risk remaining locked into their design trajectory? For example, will Italian manufacturers be capable to cope with a global shift in cultural attention to Eastern societies? If a core competence for design-driven innovation is the network of interpreters that has close interaction with a firm, a major shift in the locus of cultural production could, for example, jeopardize a firm's capability to interact with the design discourse. The firm's privileged network of interpreters that allows access to the design discourse may therefore be both a major asset and also a core rigidity for the firm itself, similar to what happens in technological transitions (Glasmeier, 1991). Italian entrepreneurs recognize how managing the dynamics of the network of interpreters is a major long-term challenge (Verganti, 2006, p.120):

It is easy to make a list of the top ten designers of the past ten years. But I'm virtually certain that fewer than half of them will be among the top ten designers of the next ten years.

—Alessi

Theories in technology management have dedicated much attention to how firms cope with technological paradigms and transitions (Abernathy and Clark, 1985; Dosi, 1982; Tushman and Anderson, 1986) and especially to challenges faced by incumbents (Chesbrough, 2001; Christensen, 1997; Christensen and Bower, 1996; Christensen and Overdorf, 2000; Christensen and Raynor, 2003; Christensen and Rosenbloom, 1995; Danneels, 2004; Veryzer, 2005). These theories could provide additional insights into investigation of design leaders' reactions to major cultural shifts. There are, indeed, examples of firms that have been capable of surviving major transitions, thanks to their capability of continuously refreshing and restructuring their network of interpreters. Alessi, for example, periodically activates major research projects to explore new radical languages for the purpose of identifying new architects and designers outside its current

portfolio. In the mid 1990s, Apple searched for its vice president of design (Jonathan Ive) outside the typical network of interpreters in the computer industry (Ive was known to be a bathroom designer).

Sociocultural Regimes and the Role of Complementary Assets

As anticipated, design-driven innovation implies a modification of sociocultural regimes. Italian manufacturers' goal of identifying key interpreters according to their capability not only to interpret but also to influence the evolution of sociocultural models is an indication that successful firms care not only about the creation of a new proposal but also about the modification of the context in which to propose the innovation.

A similar pattern has been shown by radical innovations of technologies, which ask for significant changes in the environment (technological frame) in which products are used (Callon, 1991; Geels, 2004; Latour, 1987). In terms of managerial implications, theories of technology management suggest that when an innovation has a significant impact on a technological frame, its success significantly depends on the complementary assets controlled by the firm, such as complementary components, distribution channels, production, and service (see the seminal work of Teece, 1986). Do complementary assets play also a major role in explaining the success of design-driven innovation? A stimulating array of research could investigate to what extent the success of design-driven innovations such as the Apple iPod or the Swatch may be explained by the control of these assets.

Dominant Languages and Dominant Designs

Studies on cultural anthropology and cultural branding show that the meaning given to products often coagulates around archetypes and that often some products and brands may emerge as icons that may survive longer than normal competitors (Holt, 2003). Studies in technology management have shown similar dynamics. The present study refers particularly to two concepts: dominant designs and business classics. A dominant design is “the design that wins the allegiance of the marketplace, the one that competitors and innovators must adhere to if they hope to command significant market following” (Utterback, 1994). Theory on technology management has sug-

gested that industry dynamics change significantly in nature after a dominant design emerges: Competition moves from product innovation to process innovation, and efficiency and the number of competitors significantly decrease (Suarez and Utterback, 1995; Utterback and Abernathy, 1975). In addition, in their investigation of the success of the Sony Walkman Sanderson and Uzumeri (1995) found that some models (which they call “business classics”) have a longer life cycle than others, and trace back this phenomenon to the management of product families.

These theories have focused mainly on technological and functional features: A dominant design, for example, “takes the form of a new product synthesized from individual technological innovations introduced independently in prior product variants” (Utterback, 1994, p.33). These theories could be relied upon to explore the nature of competition as a consequence of design-driven innovation. Is competition affected by the emergence of archetypes and icons? Is the number of competitors being reduced after a new archetype is created? First, explorations on large data sets seem to show that industry dynamics are less affected by the emergence of dominant product languages (Dell’Era and Verganti, 2006) and, instead, that cultural dynamics and meanings have more effect on product longevity and the emergence of business classics (Marchesi, Verganti, and Sanderson, 2003).

Architectures and Components as Languages and Signs

Studies in technology management have shown that innovation may concern single product components or entire product architectures (Henderson and Clark, 1990). Proper architectural designs can also facilitate innovation through recombination of single components (Baldwin and Clark, 2000). However, the innovation of the architecture itself tends to pose a greater challenge, as product architectures are strictly entangled in the organization of the innovation process of a firm and therefore questions its existing core competence (MacCormack, Rusnak, and Baldwin, 2006). We may wonder if similar dynamics concern the innovation of single specific signs (the components) compared with innovation of entire design grammars and languages (the architectures), with the latter being more managerially challenging than the former. That these dynamics are happening and worth exploring is

testified by studies on product semiotics, which actually and curiously follow similar patterns of investigation where rhetoric figures are used as operators to create new combinations of signs similar to what happens with modular architectures (Dumas, 1999; Van Onck, 1994, 2000). The managerial implications of these investigations of product semiotic remain, however, largely unexplored (Karjalainen, 2003; Kreuzbauer and Malter, 2005), and studies on technological architectures may provide useful support.

Design as Research: A Knowledge-Based Exploration of New Languages and Meanings

Studies on design management have often considered design as a creative process occurring during concept generation and product development. Analysis of leading Italian manufacturers shows that the process that leads to design-driven innovation is not based on peculiar creativity tools or methods. The major asset relied on in radical innovation of meanings is knowledge about the evolution of sociocultural models. The process of generating and assimilating this knowledge (through interaction with the design discourse) has been properly documented by Italian manufacturer studies (Zurlo et al., 2002) or even by the manufacturers themselves (Officina, 1983; Mendini, 2003). This process starts well before concept generation and product development (Figure 5; see also Verganti, 2008).

Consider, for example, the relationship between the lighting company Artemide and Memphis, the well-known radical cultural movement founded by architect Ettore Sottsass in Milan in the early 1980s. Memphis’s group of architects wanted to experiment with applying the bold breakthrough language of post-modernism to products (in particular, furniture). That language was completely in contrast with the dominant language in the market at that time (the minimal “good design” of the seventies and eighties). Ernesto Gismondi, chair of Artemide, was one of Memphis’s major financial promoters, not because of his love for art or for a sense of patronage but because for him this circle was a real research laboratory on new languages and because the architects were design researchers (Verganti, 2006, p.121):

Ettore Sottsass needed some funding for Memphis. I gave them money and let them free to do what they wanted. For me, this was a laboratory.

—Gismondi

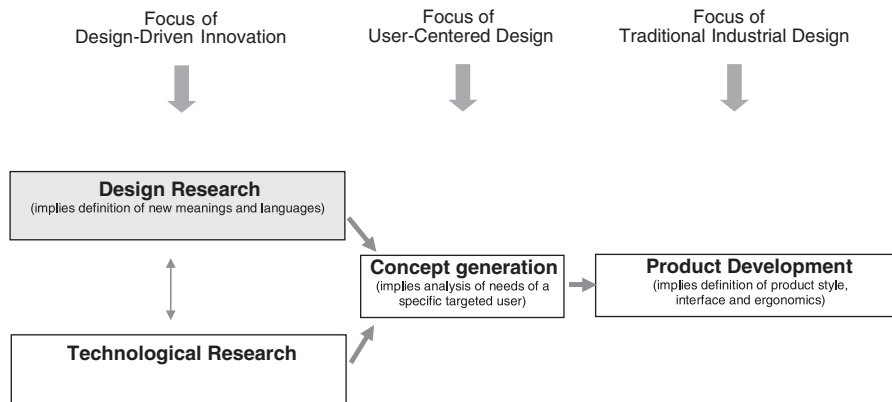


Figure 5. Design-Driven Innovation as Research

While user-centered design has the merit of moving the attention of design management scholars and practitioners upstream from product development to concept generation, the investigation of design-driven innovation calls for moving the focus even earlier in the innovation process, where firms sense the dynamics of sociocultural models and think of new languages and visions with an exploratory aim. This process resembles a typical process of technological research, aimed at untargeted exploration of new technical possibilities. Different from concept generation, this process is more knowledge based than creativity based. Gismondi's previous quote also emphasizes that the discussion here is not of research on sociological and sociocultural trends. Like technological research, design research is applied: It is the real exploration of new languages embedded into artifacts and, indeed, also implies playing with new technologies and new materials.

Theories on technology management may provide useful models to study design as a knowledge-intensive research process in firms. In particular, this paper refers to studies that apply a resource-based perspective to innovation (Kogut and Zander, 1992; Leonard-Barton, 1995) and that look at innovation as a process of generation, integration, and retention of knowledge (Iansiti, 1997; Weick, 1995).

The Design Discourse and the Paradigm of Collaborative Innovation

The key issue for firms pursuing design-driven innovation is accessing and internalizing knowledge in the design discourse. This is a collective and networked research process on meanings and design languages

that takes place outside the boundaries of the firm. How may companies develop strategies and routines to effectively interact with the design discourse? Studies on technology management again could provide significant insights in this regard. Indeed, they have recently witnessed a significant growth of attention to how firms may manage research processes that cross the firms' boundaries (Soh and Roberts, 2003; Sorenson and Waguespack, 2005). They have shown how firms should manage research and development in a systemic perspective, where their research and development (R&D) lab—albeit large—is only a small part of a huge network of researchers, institutions, and firms (Huston and Sakkab, 2006; Rigby and Zook, 2002; Wolpert, 2002). Scholars in this perspective talk of business ecosystems (Iansiti and Levien, 2004) or open innovation (Chesbrough, 2003; Christensen et al., 2005). Von Hippel (2005) further investigated the crucial role of users in these networks of innovators. When considering innovation of languages, this phenomenon is even more relevant. Whereas technologies may be developed by an internal R&D department with controlled experiments, sociocultural models are instead shaped by society, and internal R&D labs can only detect and influence them (Durgee, 2006). Studies on design-driven innovation can therefore benefit from the wealth of technology management investigations on collaborative innovation and vice versa.

Managing the Network of Interpreters in the Design Discourse: Alliances and Codesign

If design-driven innovation is favored by the interaction with the design discourse, then managing the interaction with key interpreters in the design discourse

is a crucial issue. Indeed, Italian manufacturers give great attention to identifying the key interpreters in the design discourse and attracting them and developing with them a privileged relationship. For example, one of the key consultants of Alessi, who helped the company to spot new talented architects worldwide and helped the company to explore new radical languages, is Alessandro Mendini. The relationship built by Alessi with this key interpreter is definitely unique (Moon, Dessain, and Sjoman, 2004):

*Alessi doesn't make us feel as if we work for Alessi.
Rather, we feel as if Alessi is working for us!*
—Alessandro Mendini, architect

How firms pursuing design-driven innovation should effectively select, attract, and cooperate with key interpreters? How should they reward them? Management of technology faces similar challenges when dealing with key partners (Nooteboom, 1999), suppliers of technologies (Sobrero and Roberts, 2002), and scientists (Stern, 2004) to be involved in cooperative research processes. Indeed, the past decades have been filled with investigations on alliances and cooperation among firms in product development (or codesign; Clark, 1989; Liker et al., 1995). Several factors that can lead to successful cooperation have been underlined, such as trust, cognitive proximity, and weak ties (Granovetter, 1982; Nooteboom, 1999). Do similar findings hold also when dealing with design-driven innovation?

Designers as Brokers of Languages and Gatekeepers

Among all interpreters in the design discourse with which a firm may interact, there are some that have a crucial network position. Some may act as crucial gates that facilitate a firm access to the design discourse; others are bridges between different sociocultural worlds and industries and therefore facilitate the transfer of knowledge on meanings and languages among different contexts. Similar roles may be identified in technological innovation.

First, seminal studies on the organization of research and development have analyzed the role of gatekeepers (Allen, 1977). Key interpreters, and in particular designers, may similarly act as gatekeepers: They facilitate the access of their manufacturing clients to the ongoing discussion about design languages, bring bits of knowledge, and help their

clients interpret the design discourse and position themselves into this discourse. Mendini's role may be assimilated to a gatekeeper, as he has been for Alessi a crucial gate to access the design discourse.

Second, recent studies have observed the role of brokers, which move technological knowledge among different industries (Harada, 2003). Some investigations even analyzed the brokering role of designers and design firms (Bertola and Texeira, 2003; Hargadon, 2003). A study on IDEO, for example, has shown how this design firm acts as a technology broker, with access to as many as 40 different industries and exploiting its network position to move solutions across industries (Hargadon and Sutton, 1997).

What is peculiar in design-driven innovation is that designers act as brokers of knowledge on languages and not just on technology. Language brokering is even easier as product languages are not industry specific: They move across industries more fluently than technology. Consider, for example, the diffusion of colored translucent materials from home furniture to computers (a linguistic exercise that let the Apple iMac speak the language of home rather than office, in which case Ive, who had previous experience in domestic products, acted as a broker of languages from households to computers). Design languages can also move across different sociocultural worlds (e.g., across different countries), although this is a more complex process than fertilization of signs across industries, given that meanings are significantly culturally embedded. Indeed, Italian manufacturers involve a great deal of foreign designers in their innovation process, combining and integrating the brokering of knowledge on both the local and global settings.

Hence, in the same way as the action of technology brokers, designers exploit their network position to move languages (and the meaning and values attached by people) across industries and sociocultural worlds. As studies on technology management have deeply investigated the role of knowledge brokers, can these studies stimulate a better comprehension on the role of key interpreters on design-driven innovation? For example, recent investigations have questioned the role of gatekeepers and knowledge brokers, as they jeopardize the capability of firms to deal with long-term changes (Fleming, Mingo, and Chen, 2005); these same studies have even questioned the role of teamwork when dealing with breakthrough innovation, which seems more favored by the action of lone inventors (Fleming, 2006). Does language brokering face similar challenges?

Immersion in the Design Discourse and Absorptive Capacities

Interacting with the design discourse to access knowledge on product languages is not sufficient for design-driven innovation. A firm also needs to interpret this knowledge, to select important stimuli and disregard others, to interiorize it, and finally to develop its own unique vision and language. How does selection and assimilation of knowledge on new meanings and languages actually occur? How is a company like Alessi—which receives thousands of sketches and designs every year from several designers around the world—capable to recognize those designs that will be successful in the marketplace? What makes Alessi so effective in selecting a future influential interpreter before his competitors do and in understanding and assimilating their radical language, akin to a successful merchant of art who spots great painters when they are still unknown?

Literature on technology management has dealt with a comparable problem. One of the most interesting models in this regard is the concept of *absorptive capacity*, introduced by Cohen and Levinthal (1990). An organization's absorptive capacity is indeed its ability to understand and value external knowledge and therefore to make sense of it, to learn about it, and to adopt new approaches regarding it. According to Cohen and Levinthal, access to outside information cannot be restricted to gatekeepers, especially in rapidly moving environments, but should be extended to the entire organization. More importantly, assimilation and exploitation of external knowledge may occur only when the organization already has had prior experience in the field (combined with diversity of expertise). We may wonder if interaction with the design discourse also implies the existence of absorptive capacities and how these can be created. This would make an interesting point that would actually explain why developing a superior capability to rely on the design discourse is not an immediate endeavor and may instead take significant time. An organization should in fact start a long (hopefully virtuous) circle of creation of absorptive capacities, interaction with the design discourse, strengthening of the ties with key interpreters, further development of absorptive capacities, and so on. Indeed, observation of Italian manufacturers seems to show that experience in the field and long-standing immersion in the design discourse have a major role in explaining the capability of those manufacturers to select and assimilate design knowledge (Verganti, 2008):

My luck? Since I was a teenager I frequented the great architects with my father.

—Carlo Molteni, chair, Molteni

Conclusions

The growing attention to design as an important competitive weapon has recently contributed to a wealth of studies on design management. These studies have mainly focused on user-centered design, an approach that starts from a deeper understanding of user needs and applies design thinking to creatively generate new product concepts. Although investigations on user-centered design have provided relevant and crucial contributions, analyses of leading design-intensive manufacturers (e.g., Alessi, Artemide, and other firms in Northern Italy) show that innovation led by design may also follow a significantly different pattern. In particular, starting with the definition of design as “making sense of things”—and therefore as the action that aims at innovating the meaning and language of products—this paper has focused on design-driven innovation, that is, the radical innovation of products meanings and languages. Design-driven innovation is not pulled by user requirements or observation. Customers hardly help in understanding possible radical changes in product meanings as they are immersed in a sociocultural context that leads them to interpretations that are in line with what is happening today. Radical changes in meanings instead are coupled with radical changes in sociocultural regimes, which might be understood only by looking at long-term phenomena with a broader perspective. Design-driven innovation is therefore a proposal pushed by a firm's vision about possible breakthrough meanings and product languages. Theories of user-centered design therefore hardly explain how this radical approach to design, which plays a central role in the competitive strategy of design leaders, may be effectively managed. This paper has aimed at providing a first contribution to fill this empty spot in design management theories.

First, a metamodel for the management of design-driven innovation was introduced. In this metamodel a manufacturer's ability to understand, anticipate, and influence the emergence of new product meanings is built by relying on external interpreters (e.g., architects, artists, firms in other industries, schools, the media) that share its same problem: to understand the evolution of sociocultural models and to propose

new visions and meanings. Among these interpreters flows a continuous collective process of investigation and experimentation on meanings and languages called here the *design discourse*. Managing design-driven innovation therefore implies managing the interaction with the design discourse to access, share, and internalize knowledge on product languages and to influence the shifts in sociocultural regimes.

Second, this metamodel was used to highlight analogies between design-driven innovation and the research process that leads to breakthrough technological innovations. These processes share many similarities, with the major difference being that the former deals with knowledge on languages and meanings and the latter deals with technological knowledge. In both cases there is talk of, for example, breakthrough changes, required changes in the contextual environment (sociocultural or technological regime), landmark products (icons or dominant designs), sharing of knowledge in network of innovators (design discourse or business ecosystem), and collaboration with external experts (key interpreters or gatekeepers). These analogies allow the investigation of design-driven innovation to be grounded in theories of technology management, therefore taking advantage of decades of research in this field.

Two clarifications should be made about the scope of the present discussion. First, analogies with theories of technology management were explored. We are conscious that these theories are not the sole lenses through which to look at the management of radical innovation of meanings—and, indeed, studies on cultural branding may provide additional perspectives. The application of these theories to design-driven innovation can bring novel insights that add to other existing contributions. Second, we are aware that theories of technology management cannot be moved as such into the investigation of design-driven innovation. They need to be translated and adapted to analyze a phenomenon that of course has its own peculiarities; for example, this paper has shown that unlike technologies, languages move more easily across industries but less easily across countries. And, vice versa, it can be expected that theories of technology management themselves may end up being improved and strengthened from these translations and adaptations into design management. In this way, the present paper may possibly contribute to paving the way toward a more unified theory of innovation management that may hold for both innovation of technologies and meanings.

An important final comment is that the purpose here has not been to solve, but to activate. Definitive answers to research on design-driven innovation have not been provided herein. Rather, the aim has been to stimulate further investigation by suggesting possible lines of research in a field that is still largely unexplored. The hope is that this paper is only a first step in a long exploration effort to come.

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