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Designjournalen är till för att publicera artiklar som utforskar hur design kan utgöra en viktig resurs i näringsliv, offentlig sektor och undervisning av såväl tekniker och ekonomer som designer. Genom att sprida forskningsresultat om design kan en ökad medvetenhet och effektivare hantering bidra till att skapa konkurrenskraft och framgång.

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INTERACTIVE INSTITUTE

Kunskap om design som stöd för innovation blir allt viktigare



Robin Edman, VD
Svensk Industridesign

Näringslivets nya villkor gör att kunskap om design som stöd för innovation blir allt viktigare. Denna förändring leder till nya möjligheter både för designbranschen och SVIDs verksamhet. Samtidigt ökar betydelsen av att ny kunskap lyfts fram.

Svenska företag möter idag höga krav på att löpande sänka sina kostnader. Det är en följd av den globala spridningen av nya metoder och teknik som driver både ökad konkurrens mellan företag samt ökade kundkrav. Dessa krav har präglat företagets utveckling de senaste åren. I en rad rapporter konstateras dock att företagen samtidigt måste öka värdet av det de tillhandahåller sina kunder för att bibehålla eller höja sina marginaler¹.

SVID och Teknikföretagen gjorde en undersökning om attityd, lönsamhet och designmognad i svenska företag under våren 2004. Den visar tydligt på positiva ekonomiska effekter för de företag som använder design strategiskt som process och/eller som innovation i företagets utveckling.

I en opublicerad undersökning av de 20 största svenska designföretagen av Ekman och Vedin visar att viljan bland designföretagen att arbeta mer strategiskt också är stark. Ett viktigt skäl kan vara att den typen av mer värdeskapande uppdrag skapar mer långsiktiga relationer och ger bättre betalt än rena formgivningsuppdrag.

SVID har under de senaste två åren arbetat med ca 300 tillverkande- och tjänsteföretag i olika

projekt. De flesta har fått konceptuella förslag från de ca 100 designers eller designfirmor som medverkat. De flesta förslagen handlar om inspiration till produktinnovationer, men projekt som "Fordonsindustrins underleverantörer", utbildningsprojektet "Design för entreprenörskap" och det kombinerade demonstrations- och utvecklingsprojektet "Design för tjänster" fokuserar på hur designmetoder kan användas för mer strategiska frågor. Här belyses design management, affärsutveckling och utformningen av hela tjänstesystem.

I detta nummer av Designjournalen beskrivs resultat från forskning om designs roll för att stödja innovationsprocesser. Mot bakgrund av den utveckling som jag beskrivit ovan är det därför viktigt att dessa kunskaper sprids både till de yrkesverksamma och till de utbildningar som undervisar om design som metod. SVID centralt kommer att stärka resurserna för området och tillsammans med vårt nätverk driva dessa för framtiden så viktiga frågor.

Forskning och kunskapsspridning är ett långsiktigt arbete vars fokus ligger på effekter långt efter Designåret 2005. Som en del av det långsiktiga arbetet, som kan utnyttja Designåret som ett avstamp, arbetar vi nu med att utveckla Designjournalen för att bättre fånga upp och sprida intressant ny kunskap, både från den akademiska världen och andra källor.

Nästa år kommer bland annat dessa frågor att diskuteras i samband med era05 konferensen i de nordiska länderna. Speciellt fokus på forskning och utbildning blir det i Helsingfors och Lund. Glädjande är också att Nätverket, Swedish Design Research Network, D&R nu är formellt bildat och att vi och de andra medlemmarna drar igång vår första doktorandkurs under 2005.

Vi går en mycket spännande tid till mötes och hoppas på ett stort engagemang i dessa viktiga frågor.

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(1) - Innovativa Sverige - en strategi för tillväxt genom förnyelse, Ds 2004:36, utgiven av Näringsdepartementet och Utbildningsdepartementet.
- På den tillväxtpolitiska agendan, A2004:023 utgiven av ITPS

Redaktörsanteckningar



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Nu är det snart Designåret 2005. En slags kulmen på regeringens snart 20-åriga satsningar på design om man utgår ifrån att det började med instiftandet av Svensk Industridesign 1985. Behövs regeringens stöd till design? Runt om i världen ser vi hur regeringar stödjer designindustrin på olika sätt för att den ska bidra till nationell tillväxt. I början av november var jag i Bangkok för ett projektmöte om designutbildningar och träffade i samband med studiebesök på företag, universitet och exportråd representanter för thailändsk industridesign. Många har besökt Thailand som turister och handlat billiga produkter, inte minst kopior av dyra varumärken. De flesta tänker nog inte på Thailand som en "designnation" och få thailändska varumärken är internationellt kända. Thailändska företag är snarare underleverantörer till västerländska företag. Ambitionen att öka landets konkurrenskraft och konkurrera med egna varumärken finns dock. Att stödja design är även i Thailand ett recept för detta.

Stöd till design och näringsliv har förekommit i Europa under många år, och blivit allt vanligare även i asiatiska länder, förutom i Thailand även i Kina, Korea och Indien. Alla dessa regeringar verkar övertygade om att design är en framgångsfaktor, men att design behöver stöd för att komma igång. Precis som trädgården behöver gödsla behöver olika aktörer stöd för att bli starka och sedan själva klara konkurrensen. Ett sådant stödprogram i Thailand är OTOP som betyder "en by, en produkt". Ett antal byar har fått bidrag på ca 200.000 kr för att tillsammans med en designer ta fram produkter som håller hög internationell

kvalitet. Sådana produkter, t ex kläder, väskor, skor, souvenirer, möbler och inredningsdetaljer exporteras med framgång och säljs även i Thailand, bland annat i en speciell Otop-butik i Exportrådets hus i Bangkok. Vi i projektgruppen handlade en hel del i den butiken. Det kändes bra att köpa lite mer unika thailändska produkter, även om dessa inte hade lika låga priser som de produkter man hittade på olika marknader runtom i Bangkok.

Ordföranden för den thailändska industridesignföreningen menade dock att de flesta thailändska företag är omogna när det gäller design och det är svårt att ta betalt för designtjänster. Ett vanligt klagomål även i Sverige. Vi besökte ett par thailändska företag som ansågs långt framme när det gäller design. Ett av dessa tillverkar sanitetsporcelain och armaturer. Där finns sedan några år en designavdelning med sju anställda. Produkterna såg ut att hålla hög kvalitet och designen var mycket modern. Det andra företaget tillverkade sportutrustning, hade eget gym med avancerad utrustning och en mycket välinredd spa-avdelning. VD-arna för båda företagen poängterade att design var avgörande för framgångarna och att de därför samarbetade med designers.

Intrycket från dessa företag var att de höll en produktkvalitet som skulle kunna konkurrera med flertalet europeiska företag. Min italienske kollega, som var med vid samma möte, menade dock att dessa thailändska företag inte hade samma strategiska designarbete som exempelvis trendsättande italienska företag i samma bransch. Det handlar inte bara om att ha en designavdelning, anlita designer eller ha en allmänt god kvalitet. Det handlar om en designmognad som innebär ett

förhållningssätt gentemot design, om relationen mellan designer och övriga funktioner i företaget och hur man till exempel utnyttjar designprocessens metoder för innovativ utveckling. Av den forskning som bedrivs om designens roll och situation i svenska företag idag vet vi att många företag har åtskilligt kvar att göra när det gäller utveckling av företagets designmognad. Det finns emellertid idag en ökande medvetenhet både bland företag och allmänhet om designens betydelse. Har detta åstadkommits genom regeringens stöd via designorganisationer? Lika lite som det går att fastställa designens enskilda betydelse för lönsamhet, lika lite kan dessa insatsers betydelse värderas enskilt. Det finns dock anledning att tro att de har stärkt designkåren i landet. Om man ser till de regionala projekt som genomförts, så har de för många små och medelstora företag fungerat som dörröppnare till ett långsiktigt samarbete med industridesigner. En separat utvärdering av de satsningar som gjorts i samband med Designåret 2005 är på gång.

En annan typ av satsning som SVID har gjort under åren gäller forskning om och i design. I detta nummer av Designjournalen har vi ett antal artiklar som är resultat av designforskning. Inledningsvis en artikel skriven av Matteo Ingaramo och Lucia Rampino, båda från Product Research Unit vid Politecnico di Milano. De beskriver hur samarbete mellan forskning och företag kan leda fram till nya sätt att integrera design, öka kreativiteten och innovationsförmågan i företag. Den andra artikeln, skriven av Bengt-Arne Vedin och Sten Ekman, båda vid institutionen för innovation, design och produktutveckling vid Mälardalens högskola, har gjort en studie av den svenska industridesignbranschen och där funnit tre olika mönster av klusterbildningar. Ett kluster finns runt transportsektorn, en av Sveriges stora industrisektorer. Ett andra kluster utgörs av konstruktionsbyråer, som i allt högre

utsträckning har börjat bygga upp egna industridesignavdelningar. Det tredje klustret finns i Stockholm och är ett slags alumninätverk från Konstfack. Den här typen av forskning är intressant därför att industridesigner börjar bli en så stor grupp att det inte längre är en självklar karriärväg att som designutbildad starta eget (litet) företag. Vi kommer antagligen att se större förändringar för designutbildade personer i framtiden, då det lilla designföretaget med en eller två personer är undantag snarare än regel. Vad är då en industridesigner? Ett intressant stycke designhistoria har Björn Linn, professor emeritus, beskrivit i artikeln om den första svenska industridesignutbildningen, en brevkurs som NKI-skolan gav 1951 och som var utformad av Ralph Lysell. Från de trevande stegen att starta utbildning i design till akademisk forskning i och om design. Jan Bodin, Umeå universitets företagsekonomiska institution, redovisar i en artikel resultatet av en nationell undersökning om hur forskning i och om design utvecklats i Sverige fram till hösten 2003. Han kommer fram till att även om alla aktiva forskare inte har svarat så verkar det huvudsakligen vara doktorander som bedriver forskning. Detta är kanske inte så överraskande med tanke på att det är ett nytt område. Men Bodin poängterar att det samtidigt innebär att det krävs nätverk och stöd för den fortsatta utvecklingen. Samtidigt kan man förmoda att det också betyder att de etablerade forskningsstiftelserna saknar seniora företrädare för design, dvs personer som behandlar ansökningar om designforskningsprojekt. Ansökningar om forskning i design riskerar därför att hamna mellan stolarna och därmed inte få forskningsanslag. Det arbete som organisationer som SVID och det nybildade Design Research Network bedriver blir därför väldigt viktigt för en fortsatt utveckling av designområdet, av designutbildningar för en profession av världsklass och av kunskap om design som konkurrensfaktor.

Design research and product innovation

How design management can enhance creativity and influence companies' strategies

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Definition of an innovation process based on design research

Design knowledge may be stimulated by project research creating the basis for an opening up of University to industrial reality. Working on a design research providing a context, submitting an issue to a real principal, would enable enterprises to engage in constructive dialogue with the designer and the researchers to deal with social and cultural trends. Context analysis thus becomes an instrument to manage complex issues and, integrated to product concept creation by research-designers, capable to define a scenario for future products.

Design research actuated by Product Design Research Unit (RU) manages the complexity by turning the design issues into design tools. Tools are used by the designers involved in the research activity in order to deal with the whole issues and the pace at which said issues change. In this way product concept creation (final result of the research activity) becomes the source of a new knowledge about product design.

In design research said knowledge translates into the putting forward of solutions to major issues, such as product innovation or product system innovation, but also to problems concerning specific

project areas (i.e. space-lab equipment).

This new cultural base can define a strategic path for enterprises towards a real product innovation.

In this sense this kind of research activity can be seen as the producer of

competitive value for enterprises. Said value can be improved by a circular process in which, after any experience of product innovation, researchers reach an improved level of knowledge and research managing capability.

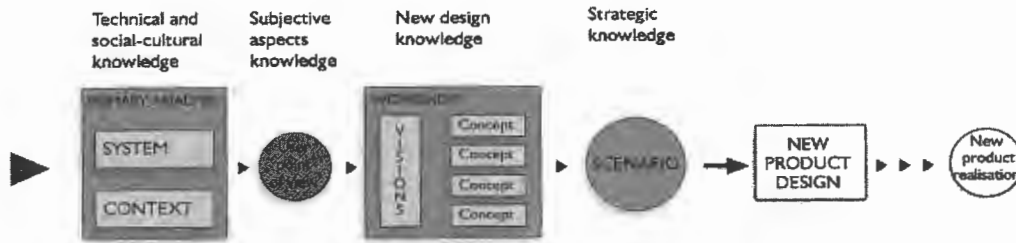


Figure 1:
The RU innovation process

According to Meurer (1997) a constant dimension for research supporting the practice of design is the notion of intervention. Every intervention generates a disturbance, and one should sharpen one's ability to understand that every design intervention is likely to solve some problems and to enable the transferring of solutions to another problem solving.

The following model describes how RU activity can turn a complex context into new product knowledge creating competitive advantage for enterprises.

The above model permits RU to renew its knowledge heritage through every research experience. It is similar to what Sless (1990) calls "iterative design", a situation where design solutions are implemented and constantly evaluated and modified. As a method this is the situation in which a permanent interaction is built among researching, evaluating and designing: these three tasks become part of a recurring loop.

The whole factors and actors system (context, the first step of the model above) can be analysed creating a sort of filter (the second step) through which the said system becomes a redefined combination of design issues.

The importance of this analysis is settled by the user centered approach, the user point of view: this approach means to consider all subjective and objective issues related to the user.

In this sense it becomes primary to understand what a product causes to user psychology and which is its meaning, as well as it is central to define user reactions to product functions and performances.

New design issues can be used then to define some visions of the context in order to enable the research designers to interpret them with a product concept (the third step).

This activity, that integrates research to design practice, defines a possible scenario for the product: the key for new knowledge and for innovation.

In order to reach the best results in this kind of research activity, Product Design Research Unit configures itself as a promoter of research projects on concept creation and design of industrial products and services.

Product Design Research Unit involves Producers and Private or Public Institutions as partners and references of the research activities, professional designers as concept creators and experts as consultants for specific areas like sociology or advanced technologies.

The activities that made up the whole research process are:

- Definition of context's visions (consumer habits, market evolution and actors)

- Multidisciplinary consulting on investigated market areas and product categories
- Brief definition and competition workshop
- Product and service concept generation
- Scenario building (definition of consumer habits, market evolution and actors)
- Product and service development
- Publishing of scientific activities and research results.

This activities can be considered a novelty for the Italian industrial and academic context for two reasons.

First of all, the Italian production system is characterised by a series of small and medium size companies, which are often managed at a familiar level or by a small number of managers. This characteristic contributed to the Italian world production (design??) success because of the individual creativity and/or intuition capability. At the same time and for the same reason Italian companies really need an external contribution to systematise their innovative potential in order to face the global market and at a big production scale.

So RU can provide companies with resources dedicated to innovation investigation; these resources do not usually exist in small-medium companies' structure. Furthermore, since RU works at an international level with global companies, it is able to act a mutual transferring of competences from large to small companies and vice versa.

The second point of novelty can be found considering the change into the Italian academic context. In the last years the academic system has created the condition for the approach of university to companies, leaving the previous auto-referential way to conduct research. The RU and the Department in which it operates are experimenting the action/design research within the Italian production system.

First Step -The primary analysis

To analyze the system and the context of a product means to identify all the elements that can influence the conception and the use of a product: we can distinguish them into actors and factors. Actors are companies' management, designers and the whole of consumers including social and economic institutions. We can define factors: trends about consumption and lifestyles, products, actions, the environments in which said actions take place, the interactions among users, artefacts and spaces, and users' behaviours.

Second Step - The trend analysis and the user point of view

The analysis of trends in the social field and in the consumption field is a fundamental step in the research activity of the RU. In this analysis are involved experts and consultants in many disciplines like psychology, sociology, anthropology, semiology, communication. RU also involves marketing experts coming from the industrial sector under analysis but also from related fields (i.e., in the case of office furnishing, experts in the field of lighting systems and domotics were involved). The RU process goes from more general to more specific issues, starting from social trends in order to analyse their influence on the production of consumer goods and in order to define what trends are more strictly related to the field under analysis. Particular attention is paid to define the "extreme" trends that can pull ahead product innovation. For example, office furnitures can be studied starting from the analysis of not typical office work like the call-center operator or the industrial machinery operator. As said before, RU takes into account also the evolutionary trends related to the artefacts complementary to the studied product (lighting and domotics in the office furniture case); this is done in order to guarantee the functional correspondence of the solutions to the changing context. This kind of analysis

asks for an exchange of knowledge among different project researches. Every trend analysis performed by RU becomes a dowel of the mosaic of the innovation process and can be useful for the completion of the context analysis of specific products in different research projects.

The user point of view and the experience

According to Hanington [2000] if current trends are any indication, the relevant concerns for product use are much more holistic than in the past. While issues of comfort, safety and intuitive use are no less important, the totality of experience is now recognized as the responsibility domain for designers. At the same time, the consequential relationship between performance and preference can be inverted.

Colin Burns, leader of the interaction team of Ideo in London, believes that companies have entered the post-disciplinary age of "interaction design": "It is obvious that design activity is finally related to consumer's experience, that has its environmental context and a system of relations with different technological and functional systems...".

According to Vinyets [2000] and his definition of "prospective design", product design is an ethnographic phase that goes beyond the product itself, as a narration of experience, a story to be explained through observation of the way products are used. Therefore, the product is not the expression of an idea, but the materialization of a potential experience.

Companies often manage product innovation facing technological issues and trying to get an improvement of product performances; sometimes that causes a functional redundancy of the product. Observation and interpretation of the real experience of the actors related to the product can be an effective solution. In this way a level of qualitative knowledge can be created; this knowledge also integrates the quantitative value of the

marketing analysis.

The study of the consumer's experience with the product generates the construction of a narration that includes the everyday use of the artefact; this narration can be put into a system in order to obtain "visions" of and for the future.

The subjectivity: a tool for innovation

According to Schianchi [1997] life goes on two levels: "... the first level is the material one, the physical one; the second level is the spiritual one, the psychological one. These two levels are part of a whole: the material structure of life is pushed from the spiritual one, but the spiritual one shows itself in the limits given by the material structure in which it is inserted."

Economic aspects of both the material and the physical level are perhaps able to be known using already consolidated economic theories, but economy, considered in psychological terms, made of subjectivity, interpretations and expectations, is absolutely unable to be known using common approaches. What is worth for the material level cannot be worth for the spiritual one or for the psychological one: according to Schianchi, the individuals' behaviour is not always explicable only in terms of supply and demand because it is situated on another level of knowledge. This knowledge level is one of the research target.

Through the integration with the knowledge heritage of companies, the RU is able to lead managers and entrepreneurs into the complexity of the product system and to enable them to read the innovative visions of their projects as an instrument for market competition.

According to Zurlo [1999], generally the behaviour of a top manager, beyond an ideological-institutional context, refers to a well defined scheme of behavior: gathering information; taking decisions; putting them into practice; checking them in order to verify if they are coherent with their value. The crucial point has always been taking decisions. The entrepreneur-

manager must always be able to make a choice, right or wrong. Every choice is however based on a knowledge that managers obtain with organised methods and information abundance. On the base of the thoroughness and impartiality of this information, the manager makes a choice: the problem is that this information is often not complete or excessive and complex, therefore it is necessary to reduce or to interpret it. This necessity makes the knowledge about the product neither neutral nor univoque. Information can then be redundant, dispersive, or insufficient and misleading. So if in the theory of the decisions we find limits rationality, then taking decisions become more complex. It becomes necessary to get a tool to manage information and the whole knowledge levels, including subjective factors: a sort of map in which any factor can be connected to another creating a vision of a new product. More efficacy in managing innovation can be reached if strategic decisions are taken not only by the objective point of view, but also by the subjective one. So designers and managers are consumers and vice versa. Every actor of a new product conceiving process should share the product's meaning and subjective values.

**Third and Four Step
- Visions for innovation as a
design tools: leading product innovation
through a design process**

As we will see in the two case studies, by reaching a detailed knowledge of context, trends, experience and subjective factors we can create one or more synthetic visions. To each vision will correspond a concept creation. Such creation take place during a design workshop in which a number of designers are involved. At the end of the workshop, every designer presents a product concept that is his/her creative interpretation of the given vision. In this way, the companies that are our partners in the research activity can better understand real product innovation

chances. RU leads this creative phase by providing some tools to designers in order to transfer to them in the most effective way all the knowledge gained during the previous two steps of our process. The aim is to allow design creativity to sistematically participate in new product planning process.

At the end of RU process, a scenario can be build by finding the most frequent suggestions within the whole designed concepts. The product scenario, as it is intended by RU, is the "intersection" of several realistic product visions.

To better illustrate our process, two cases of RU design research activity with company partners are hereafter provided.

The new knowledge and knowledge management

To achieve a new level of knowledge, composed by the elements from the analysis and the design solutions, means to widen the competences of the RU in terms of technology, problem solving, user's satisfaction and, after all, innovation managing.

Such competences, if put into an organised system and subsequently reasoned using analogies, concur to activate new fields of research.

For example product research about space equipment can suggest innovative approaches to sport equipment and vice versa.

In this way, the function of the RU becomes a function of completion of the internal companies resources, which often are not sufficient to get a complete and clear vision. The complexity of the several factors that influence the approach to the product can therefore be solved by integrating analysis and proposal capabilities of both the team of RU and of the company that wants to innovate.

But every level of knowledge involves new unsolved issues that can be related to the same research field or to a more

specific one. In this second case, innovation elements that emerge during the study of a specific sector can be transferred to another related sector or can create the necessity of a deepening in terms of industrial production or technological correctness. (For example, the research on office furniture has determined the need to define new production systems and new materials able to complete the solutions resulted from the design workshop).

A key of knowledge management is therefore the capability to combine every new acquired element with a real design solution and to re-define as a new research topic that remained unsolved, but starting from a different product or a different partner.

Another key is the creation of a common "language" between research units and companies in order to exchange values and to avoid operational interferences.

We will discuss two examples of the design research activity in order to describe how this investigation process can be a real mind opener for enterprises and how a research activity can become a direct advantage for the birth of innovative products.

These examples would be able to underline how an academic Research Unit can be useful in real product conceiving-process using its extended cultural

resources, an integrated approach to product issues and, above all, an intermediate design activity as a knowledge creator.

Last, these two case histories can show how the Product Design Research Unit interacts with partners producing different kinds of goods and how each company organisation reacts in a different way.

The first research experience: the case of the intellectual work equipment Partners: Haworth Inc. and Targetti

In recent years market has changed in models of consumption which are becoming increasingly difficult to classify as they become more and more subjective. The office furniture sector reacted to these changes introducing just technological and functional improvements. That can be partially interpreted as a consequence of processes used in new products planning: innovation strategies are usually based on market guidelines and on product incremental evolutionary steps.

The gap between industry and user's complex requirements was fronted by Haworth-Castelli, the company-partner of this reasearch activity, involving RU in its product development process with the aim of gathering new tools for product innovation.

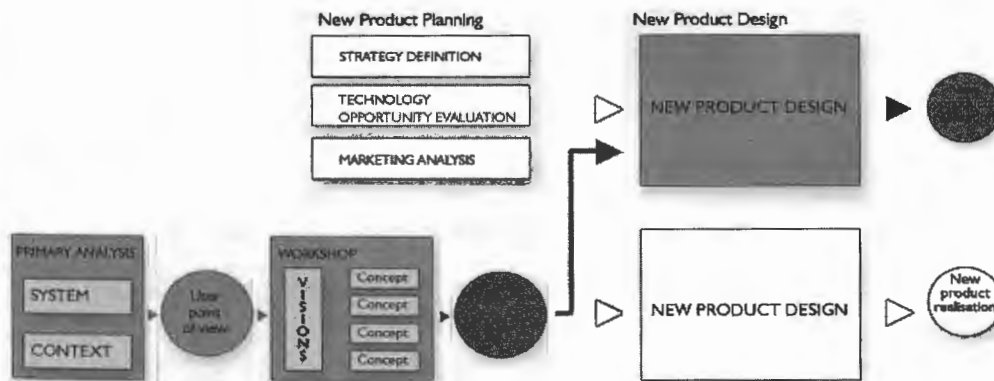


Figure 2: Haworth-Castelli new product development process and its integration with RU process

As showed in the above scheme, RU provided an improvement in the first phase of the new product development

process, the Product Planning phase, increasing the cultural references and setting a complete innovation scenario

that allowed to substitute innovation chances to evolutionary steps.

The research activity started from the analysis of the office furniture system, that is the analysis of the products already available on the market, in order to define current production trends for each element that influences intellectual work.

The aim of this analysis was to consider all possible design changes related to the product. That shifted the field of investigation from office furniture products to equipment for intellectual work and not considering the office as the unique work place any longer. That meant instead to consider the consumer's requirements of all the intellectual jobs that can take place everywhere. Equipment for intellectual work was defined as everything that

comprises the physical and sometimes psychological support for working tasks, considering that the that intellectual work can take varies and often deny definition.

The user point of view

Nowadays the equipment for intellectual work is just another commodity, whose success or failure may be triggered by new features that make it more or less appetising to human perception.

The research observed how objects generate different reactions in different people, just as space influences behaviour. Identifying situations, interpretations and environments related to intellectual work was therefore a useful approach to vision creation.

Figure 3:
On the right, working situations.
On the left: work's interpretations



Analysing work trends

The changeover from the conception of work performed in well-defined places at well-defined times to today's vision of work that can be done anytime and anywhere is the offspring of the spread of IT.

Moreover, the introduction of IT has led to the intellectualisation of several types of work that used to be purely manual and networks and multimedia

applications are generating new professions.

An influence matrix: the concept blackboard

RU created an interactive matrix of influence factors, by relating product categories useful to equip intellectual work to each of the elements obtained in the primary analysis.

The matrix was named Concept Blackboard; in it, product categories are represented using simple icons: a seat stands for every support offered to the body, a table stands for every support to the working activity, a pencil case stands for all the accessories used to personalise the working place and so on. Each of the eight designers that took part in the design workshop had to choose which product categories to deal with in the design process. The influence factors identified during the primary analysis were organised into four categories: work

typology, situation, environment and behaviour. For each category, RU chose to represent the most relevant trends using pictures.

In this way designers were able to generate "narrations" that were the real back-drop for a design concept. The matrix provided a system that relates products to evolutionary factors and works in a Storyboard like manner. Designers could choose to consider one or more cells to point out a vision for their concepts.



Figure 4:
The Concept blackboard

The polarities

The Blackboard is sequential and articulated and allows many visions of innovative products.

When product concepts are developed, a polarity system can make clearer the new heritage of innovation suggestions. The polarity system is based on the previously identified influential factors (typology, situation, environment and behaviour) that are resumed by a map. At the center of the map are positioned the product categories. The whole of the visions can be re-conducted to a scenario that can be shared by many actors. In order to create the real

product scenario it is necessary to filter the concepts resulted from the design activity through the polarity system. In the map we can find four thematic macro-areas corresponding to the quadrants.

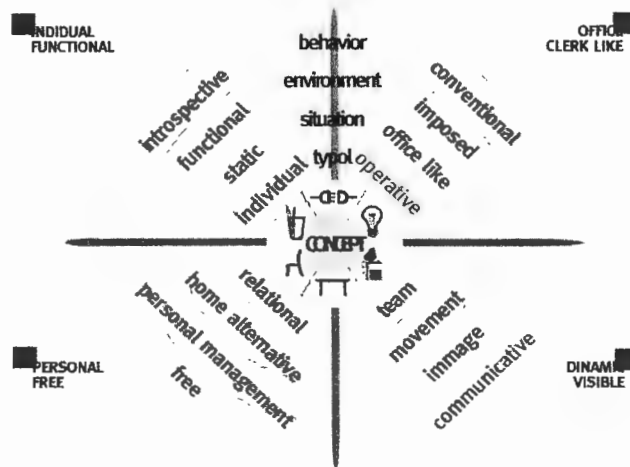


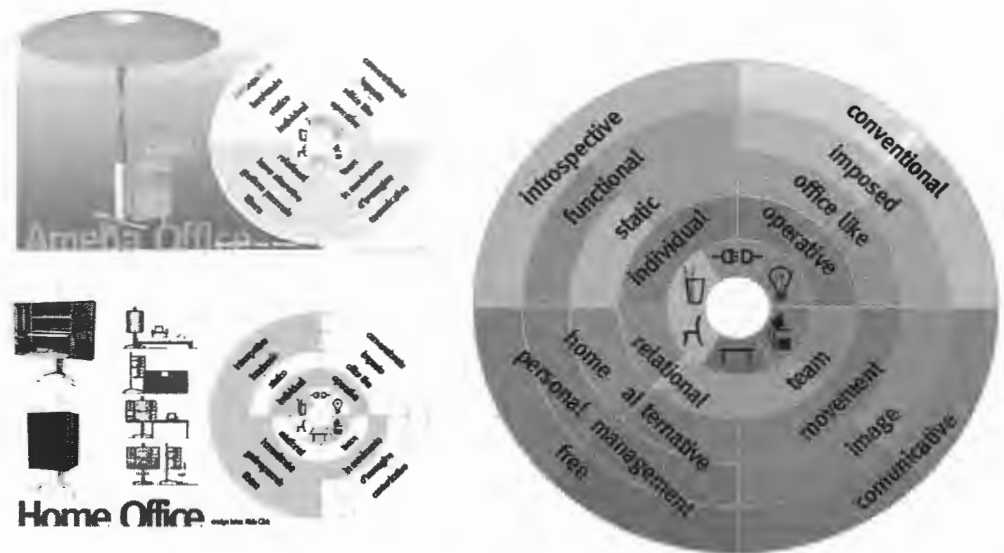
Figure 5:
The polarities map

The areas of density and the scenario

Using the polarities map to analyse each concept, we can create a sequence of possible visions by the critical aggregation of the visions generated from the concept. The superimposition of the maps resulted from the analysis of each concept evidences the evolutionary factors and the product categoris protagonists of the innovation process. In other words, overlapping

all the polar maps creates a map on which is possible to verify which are the most remarkable influential factors that have been translated by designer into product's features. Thanks to such overlap, RU generated a general product scenario. Therefore we can identify a shared scenario in which the individual operativity is pre-eminent, but with relational and team-working propensity.

Figure 6:
On the left: two examples of concept analysis using the Polarities map.
On the right: the scenario, resulted from the superimposition of all the analysis maps



Company strategy and new issues

In this case the principal accepted to introduce in its new product development process a new resource, redefining its working schemes. RU, marketing, sales, R&D and product development managers cooperated to develop new products. This cooperation produced two new product development chances that correspond to the two scenarios resulted from the research activity.

The definition of a system in which perceptive and trend aspects were related to functional and aesthetical renovation was considered by the principals as the key to set an innovative strategy and consequently a new product line. So the research activity created useful tools to manage the creative contribution of design in order to lead and then to obtain product innovation.

By following the process discussed in the first part of this paper and setting scenarios, the research project created the chance to experiment new kinds of products (for the partners) and the need to activate new research fields (in this case more specific and nearer to the real product development process).

**The second research experience: new ways for food preservation
Partner: Whirlpool Europe s.r.l.**

The innovation process in Whirlpool

From the RU point of view, the collaboration with Whirlpool Europe was particularly interesting, because it gave us the possibility to investigate a structured company innovation process, to make a

comparison between our and their process and to integrate our process with a highly structured internal one.

Whirlpool, which consider innovation one of its main strategic objectives, has an internal innovation division whose goals are to make innovation a core competence and to embed mechanisms which foster continual innovation. In order to achieve these two aims, the Innovation division of Whirlpool has developed a well-defined innovation process made up of three main steps: the **Discovery phase**, the **Innovation lab** and the **Action lab**. For each of these phase a set of specific tools has been developed.

The specific aim of the Discovery Phase is to discover new insights using five lenses (Trend exploration, Customer Experience, Core Competencies, Economic Engine, Orthodoxies). The first two lenses are aimed at understanding market trends and customer needs. The other three are aimed at achieving a deep understanding of the company internal environment.

The **Innovation Lab** is the phase for opportunity generation; it consists in a diverging moment, that is creating a lot of ideas, and then a converging one for deepening and organizing the most

relevant ones. The output of this second phase is a "new opportunity brief" that contains the time-frame for the launch of the new product onto the market and information about all the already available technologies. Every new brief is assessed using the Idea Screening Toolgate (I.S.T.), whose aim is to let the company pursue only ideas that are feasible and that provides clear customer benefits.

The intent of the following phase, the **Action Lab** is to both deepen the thinking and screen out opportunities still at an early stage of the development process. In this phase starts the real design activity, which aim is to visualize the ideas into product concepts. The concepts are then submitted to a Customer Feedback Session: at this stage of the process an immediate and valuable input from customers allows the company to readapt the idea very easily.

At the end of the Action Lab, starts an experimentation phase. If the product concept pass successfully through the experiment, it enters Whirlpool industrialization process. Only few ideas pass successfully through all the phases of the innovation process and become new innovative products.

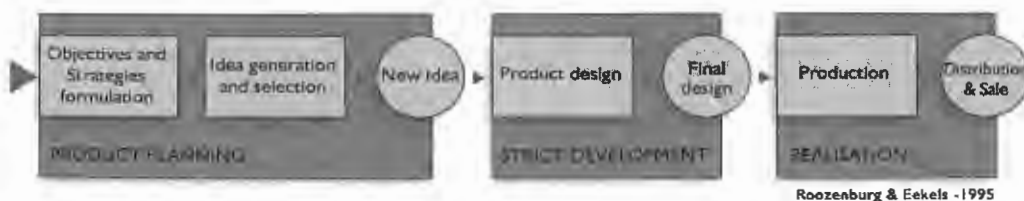


Figure 7: Whirlpool Innovation Process

The research objectives

Whirlpool decided to collaborate with the RU in order to investigate new innovation chances for the household appliances for food preservation. Up to today, the food market has been characterized by a great resistance to change, due to the fact that food is a theme that touches deep and ancestral cords and it is connected to our self-survival. But at the same time, in feeding strong trends of change are verifiable

today, also relative to the researches in progress in the fields of food technology and packaging. The research objectives were to provide Whirlpool with a deeper knowledge of the food market and to transform the most relevant market trends into real product innovation chances.

The user point of view

In order to investigate the latent necessities of the users, the RU carried out an

investigation in new rituals connected with food. A nodal point was to understand the possible modes of evolution of the equipments and tools for preserving, preparing and consuming food, in relationship to the accelerating development of all the technologies connected with food preservation, preparation and cooking, on one hand, and with the rapid evolution of customs, life styles, habits on the other.

The first step was to individualize the most remarkable phenomena in food purchasing, stocking, preparation and consumption. Europe was considered the central field of the researches, but, however, the attention was also constantly referred to American trends that always anticipate and influence European ones, at the level of macro-trends of nutrition styles too. From this research we extrapolated the modern macro-trends in the feeding field that mostly influence the household appliances field.

An influence matrix: the consumption map

After having deeply analysed the context, namely the feeding life styles in the western world, it was necessary to define a tool able to guide designers creativity in relationship to both the research objective, (products'innovation possibilities in the field of food preservation), and to the factors of influence discovered during the primary analysis phase. As already said, to provide design tools means to systematize the results of the research activity and to define the macro trends so that they can be used by designers during the design activity. In this case RU created a tool, the Consumption map, which related the new products that had to be conceived (the preservation system, at the center of the map) to the main moments of the purchasing and consumption process: food buying, food managing, food preservation and food preparation. The food is present in the map as the input of the whole consumption process.

Figure 8:
The consumption map



The polarities

At the end of the design activity, RU received from the five designers involved in the design workshop nine concepts. In order to analyse the most important aspects of every concept it is necessary to define a

series of polarity. In this case, the polarity system is based on the previously identified influential factors: food typology, buying situation, food management, food preservation and food preparation. Each quadrant represents a thematic macroarea.

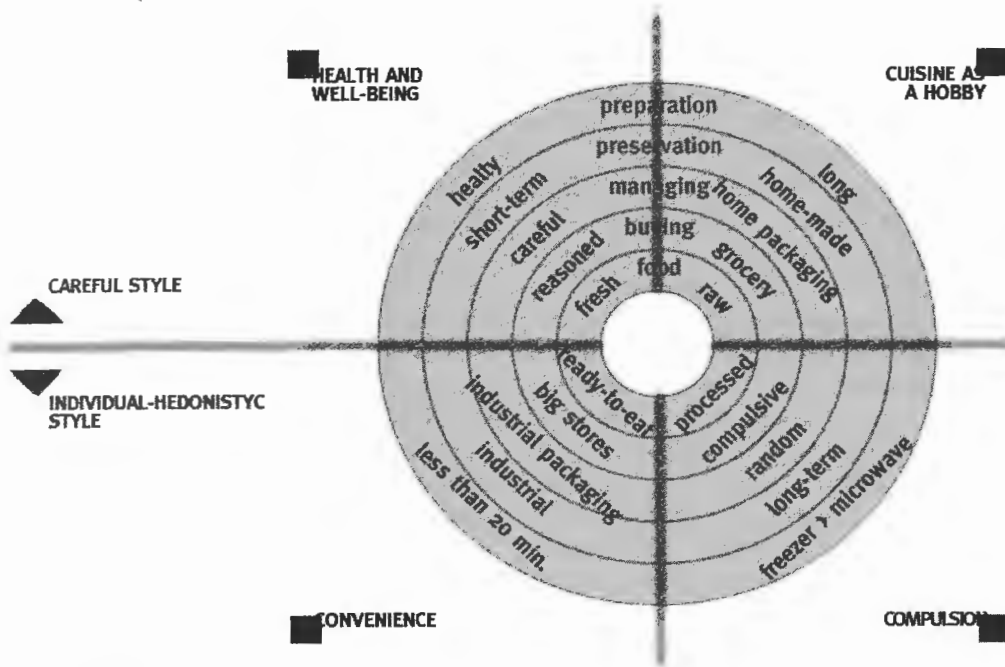


Figure 9: The polarities map

The areas of density and the scenario

As already explained, the objective of each RU research activity is to create a product scenario, intended as the "inter-

section" of different designed product visions; the scenario scope is to stimulate the partner company to start a strategic discussion that explores new products possibilities.

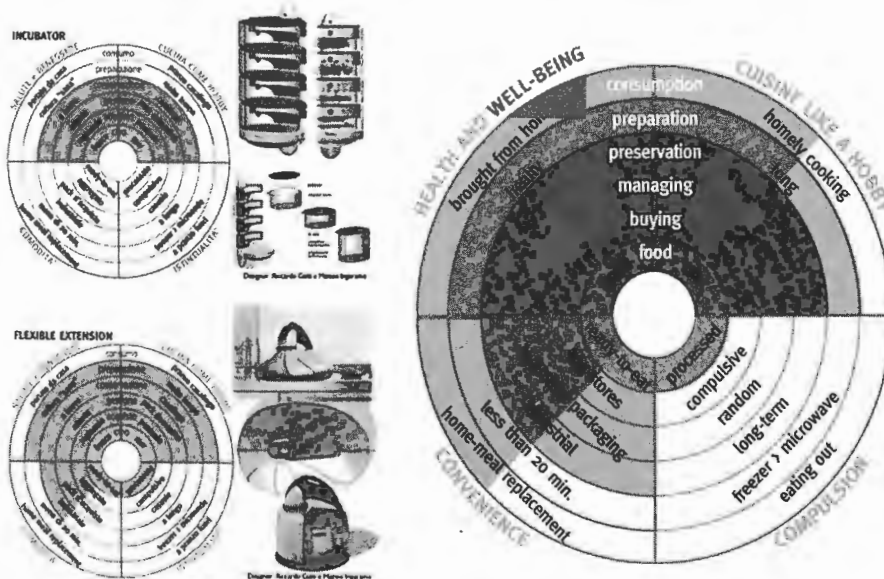


Figure 10: On the left: two examples of concept analyses using the polarities map. On the right: the scenario, resulted from the superimposition of all the analyses maps

To create the scenario, each of the nine concepts was filtered through the polarities system in which influence factors had been resumed by a map. Even in this case, the overlapping of the polar maps resulted by the analysis of each concept, generated a general product scenario.

In this scenario, it is very evident that the most innovative products were generated by designers in order to satisfy the new consumer attention to health and quality and to the convenience area. In fact, the research highlighted that, in order to satisfy the growing convenience area, food companies constantly introduce on the market new products conceived so as to allow the end user to save time. Contrarily, during the design activity no new products were conceived in order to satisfy the compulsion area. RU believes that this depends on the fact that the needs of this area are sufficiently satisfied by the products already available on the market, so they were not able to give to designers innovation chances to meet.

Company strategy and new issues

As in the furniture case, the presence of a company allowed to verify the pre-eminent aspects of the scenario. Even in this case the main aspects of the product scenario were confirmed by the concrete interest of the company in three specific concepts. The company, thanks to the collaboration with RU, managed in a different way the creative process. The effecti-

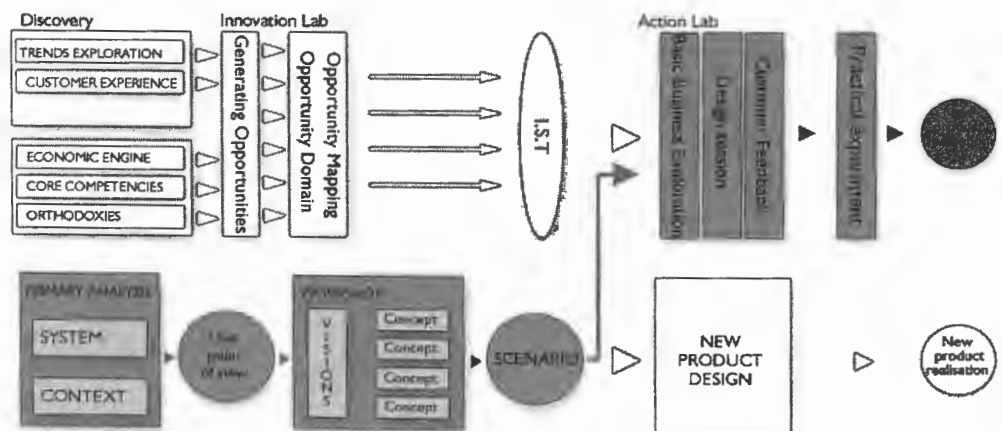
veness of this new approach was well understood by Whirlpool, that realised which were the innovative potentialities of the food preservation area and asked RU for new collaborations, in order to extend such potentialities to its whole range of products.

From RU point of view, this fact is particularly important, because it points out how the product scenario contributes to produce a change in the company strategy in terms of views widening and in terms of product ideas to enter the new product development process. From the company point of view, this change in its new product strategy means a great effort that takes a certain time to happen and needs the cooperation of several internal departments and of external consultants. This is what happened at Whirlpool where the internal Innovation group, R&D, Marketing team and RU cooperated for the further development of the three selected concepts.

Comparison between the two innovation processes and their integration

The description of the Whirlpool innovation process makes it possible to compare the innovation process of the RU. The differences between the two processes and the way the two processes integrated during the research activity are visualized in the following scheme:

Figure 11: Whirlpool Innovation process and its integration with RU process



In the RU process, to the Primary Analysis follows the definition of some "visions for the project". On the basis of these visions, a group of designers is involved to design a certain number of product concepts. These concepts, as previously described, are analysed by the RU in order to define a general product scenario. The final aim is to determine the innovative factors that are dominant in the designed concepts and to make them communicable in a synthetic and univocal way to the company which can use them as the starting point for an internal strategic discussion. It is only at this stage of the innovation process that the company, on the basis of the defined scenario, has to determine which idea shows the best potentialities to be developed during the new product design phase, phase that we can name, using a term coined by J. Eekels, *strict development phase*.

Differently, in the Whirlpool innovative process, the choice of the idea to be pursued happens when no design activity has yet been carried out. In this way, the choice is made thanks to the application of a series of tools conceived to assess an idea expressed in a written opportunity brief and the most promising ideas are chosen on the basis of a series of criteria that do not include any design activity. But we claim that it is only the design activity that can fully express the innovative potentialities of an idea. In the Whirlpool innovation process, the stage at which designers are involved is postponed to the third phase, when the most important strategic decision in order to accomplish innovation (that is, in which innovative idea to invest) has been already made, and discarded opportunities will remain unexplored from a design point of view.

We can therefore affirm that the RU anticipates the design activity to the first phase of a new product development process, the *product planning phase*. This is done with the purpose to use the design activity as a lighthouse able to address the strategic choices of a firm.

Furthermore, the collaboration with Whirlpool allowed us to evaluate how the RU innovative process is able to integrate even with highly structured internal processes. In fact, three concepts developed during the RU design workshop, easily entered the Action Lab, in order to be submitted firstly to a redesign phase (during which the concepts were adapted to the company requirements for technical feasibility, materials usage, production costs, etc.), and then to the Customer Feedback Session. So, concepts coming from an external resource (RU) entered successfully the internal product innovation process, as also showed in figure n.10. This shows the possibility to advantageously integrate two innovation processes and internal and external resources, in order to better manage the difficult challenge to achieve product innovation.

Key conclusion

In order to generalise the main findings of our research activity, it's useful to present a standard new product development process which identifies three main stages: Product Planning, Strict Development and Realisation (based on Roozenburg and Eekels, 1995). It is a broad way of segmenting the development process, but useful to obtain clarity.

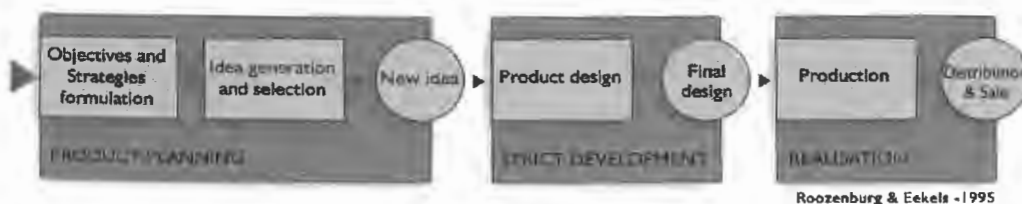


Figure 12:
A standard new product development process

Design research and product innovation

In order to achieve a real product innovation, the Product Planning Phase is the most critical one: this is the real creative phase, where creativity is intended as the act of coming up with new products' ideas. Then there is the need to put this new ideas into practice, to transform them in real products throughout the Strict Development and the Realisation Phases. According to Bettina von Stamm, we can define innovation as the sum of creativity and succesfull implementation. Thus, there is no innovation without creativity, but creativity alone, without implementation, is useless.

We claim that the most innovative companies are those that use structured methods and tools to better manage the creative phase of the new product development process, as Whirlpool Europe does. But generally, the design activity is not involved in this phase.

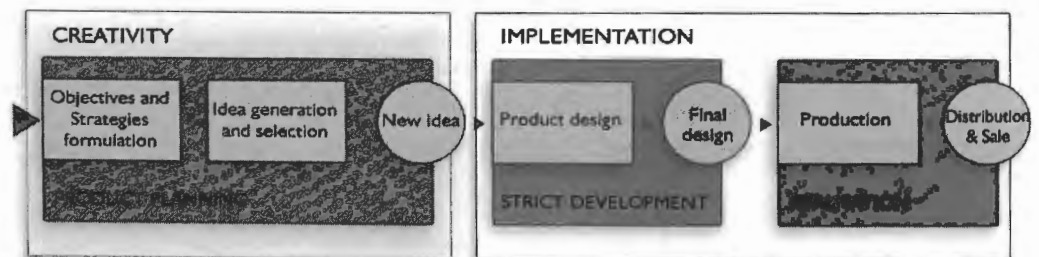
The aim of our innovation process is to help companies in the difficult activity to come up with innovative and feasible product ideas, showing them the strategic role that the design activity can play in such a challenge. In order to do this, we have developed a process and some creativity management tools that have showed their potentialities in several research experiences like the two presented cases.

Results of these experiences show that concepts creation becomes the source of a new knowledge about product design. In fact, giving a projectual solution to product-system issues means not to be

limited at the design activity, but also to explore, using the design creativity as a tool, all the variables of said system. So, creativity and knowledge management becomes the key of an efficient product development method that generates a real interaction between company organizations and designers. According to the proposed process, design should be a part of every Product Planning Phase, before the Strict Development phase, with the same role of the other widely used strategic tools (i.e. marketing tools).

Finally, we are suggesting that Design and Creativity Management inside companies should deal not only with internal resources, but also with external resources and tools that can be found into academic research prerogatives.

Figure 13:
Creativity and implementation within a standard new product development process



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Clustering of Swedish industrial design consultancies: three different patterns

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All larger Swedish industrial design consultancies have been interviewed with a view to understand the contributions of these firms to their clients' innovation activities. One result is a mapping of design firms as clustering along three different dimensions of relationships or networks. One of these translates into an industrial cluster in the regional or national sense, part of a larger one, the nationally important transportation equipment cluster. The University College of Arts, Crafts and Design serves as a fountainhead for design firm creation, with mechanisms for maintaining knowledge and competency links allowing alumni to generate feedback to the school and to develop and strengthen common tools. A recent trend features engineering consultancies complementing or improving their services by embracing industrial design, allowing for a

more comprehensive offering, industrial design regarded as an increasingly important feature.

Key words: Industrial design, industrial cluster, networks, design consultancy, technology transfer, knowledge transfer

We have interviewed and collected information on all large Swedish industrial design consultancies. A list of these is provided in Appendix 1. As might be expected, this group of firms, as any other, is in constant flux. Thus two of the companies have merged, one has shrunk, and another one has been acquired by a large engineering consultancy. These changes do not affect our analysis here.

We defined 'large' so as to mean firms with five or more employees; this is why we stated that one has 'shrunk'. To learn

of how industrial design consultancies concern themselves with innovation, we also interviewed some smaller firms, suggested by industry insiders to be of particular interest in this context. Furthermore, we interviewed some design consultancy customers, to learn about 'the other side' and check whether the consultants' perceptions were shared by their clients. By and large, they were. All interviewees have been allowed to check and verify our interview notes.

'Design' is a broad concept. The notion of industrial design, in its Swedish translation, confers a more limited meaning. Thus while 'design' in everyday language would encompass furniture, glassware, and fashion, these areas are mostly excluded from industrial design. Likewise, 'engineering design' is covered by a different word in Swedish, making for a clearer distinction between this category and industrial design than in, for instance, English.

At the outset, our concern was not to spot any clustering; but such patterns were discovered early on when interviewing. While we seldom used the phrase with them, interviewees were in most instances familiar with the phenomenon in its practical aspects, not least because of the exchange of personnel between firms and the contacts between colleagues. An analysis of contact patterns might profitably rely upon sociograms, that is, network or relationship maps¹. Here we would depict formal links such as joint projects, client-supplier relationships, mobility between employers, co-authorships (and corresponding design activities) as well as less formal ones, such as personal ties and shared forums, for example, conferences and associations. Given Sweden's concern with its important transportation equipment industry cluster, highlighted in Porter's seminal work², it seemed natural to search for design firms' links to this industry. A closer reading of the meaning of the term 'cluster', however, pointed towards other

clustering patterns.

Dictionary.com offers the following definition for 'cluster': *A group of the same or similar elements gathered or occurring closely together.* For 'industry cluster', a more elaborate and constrained definition is suggested (in *The Web Book of Regional Science*³): *A group of business enterprises and non-business organizations for whom membership within the group is an important element of each member firm's individual competitiveness. Binding the cluster together are "buyer-supplier relationships, or common technologies, common buyers or distribution channels, or common labor pools".*

The concept of industry cluster was popularized by Michael Porter, and then particularly on the level of the nation⁴. He suggested a "Diamond of Competitiveness", characterized by four key determinants: *factor conditions, home demand conditions, related and supporting industries, and industry strategy, structure, and competitiveness.*

According to Doeringer and Terkla, there is no single correct definition of an industry cluster⁵. The basic definition of such a cluster, however, can be seen as a *geographical concentration of industries that gain performance advantages through co-location*⁶. *Growth of industrial clusters is affected by factors such as competition among rival firms; agglomeration economies; labor force skills; technology transfer; knowledge transfer; and social infrastructure.*

We will rely on these characteristics when discussing our different clustering patterns.

While clusters thus are most often taken to be geographical, that is regional or national, value-chain clustering has also been suggested. A well-known example of a regional cluster is given through Saxenian's Silicon Valley analysis⁷. A cluster may contain sub-clusters as well⁸. Business networks is yet another description used in the same context, to describe or to enlarge the concept, as is the notion of

(1) Cf Allen, T. J. 1977. *Managing the Flow of Technology.* Cambridge: MIT Press

(2) Porter, M. E. 1990. *The Competitive Advantage of Nations.* New York: Basic Books

(3) <http://www.rri.wvu.edu/WebBook/Bergman-Feser/chapter2.htm>

(4) Porter, M. E. Op. cit.

(5) Doeringer, P.B., and D.G. Terkla. 1995. "Business strategy and cross-industry clusters." *Economic Development Quarterly* 9: 225-37

(6) E.g., Enright, M. J. 1993. "The Geographic Scope of Competitive Advantage," in E. Dirven, J. Groenewegen, and S. van Hoof, (eds), *Stuck in the Region?: Changing Scales of Regional Identity.* (Utrecht: Netherlands Geographical Studies 155), 87-102; Piore, M. and C. Sabel 1984. *The Second Industrial Divide.* New York: Basic Books; Enright, M. J. 1996. "Regional Clusters and Economic Development: A Research Agenda," in U. Staber, N. V. Schaefer, and B. Sharma, editors, *Business Networks: Prospects for Regional Development.* New York: De Gruyter

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Clustering of Swedish industrial design...

(9) Eliasson is a prolific writer on this subject, see for example Eliasson, G. 1998. "Competence Blocs and Industrial Policy in the Knowledge Based Economy", OECD Science Technology, Industrial (STI) Revue, 1998 or 2000. "Industrial Policy, Competence Blocs and the Role of Science in the Economic Development". Journal of Evolutionary Economics, No. 1, 2000

(10) Hörte, S. Å. (editor) 2003. Simulering av innovationssystem. Högskolan i Halmstad

(11) Cf Vedin, B-A. 1993. Nätverk för produktion och kunskap. Malmö: Liber-Hermods

(12) Roubert, C. J. Op. cit.

(13) Porter, M. E. Op cit.

'competence blocs'⁹. Hörte¹⁰ identifies seven interrelated concepts, one of them, again, networks¹¹. Quite often, path dependence is an important factor in the evolution of a cluster.

As hinted above, the reason for this excursion into definitions and delimitations, however provisional or with diffuse boundaries, is that, given the basic definition of 'cluster', we have found three rather different patterns of clustering of Swedish industrial design consultancies. Just one may be seen as an industrial cluster having an important regional or national *production system* dimension to it. The other two display competency and knowledge networking in different ways. A brief description of the three patterns might elucidate the argument:

- The transportation equipment industry cluster: Sweden has two passenger car manufacturers; it features two of the world's leading heavy truck and bus manufacturers; and it has other important transportation equipment manufacturers, in the rail car, fork lift truck, and locomotive businesses - a number of industrial design consultancies may be seen as constituent parts of this larger cluster, to a large extent but not entirely located to the west coast, in the vicinity of Gothenburg (while Scania is located south of Stockholm, the capital)
- The engineering consultancy development trajectory: because of competency, resource, and market demand rationales, large engineering consultancies embrace industrial design to offer sufficiently comprehensive services
- The University College of Arts, Crafts and Design alumni network, creating a cottage industry of 'spin-offs' in the greater Stockholm region

It should be noted that there is a considerable overlap between the first two categories; for most engineering consultancies transportation equipment manufacturers constitute a substantial share of their business volume.

The transportation equipment industry cluster - industrial design a subset

As mentioned, much of Sweden's transportation equipment industry is located to the country's west coast and the vicinity of Gothenburg, though not all. Saab Cars and Volvo Cars as well as Volvo Trucks and Buses have important facilities there, as have Volvo Aero (aircraft engines), Volvo Penta marine motors, and Atlet Fork Lift Trucks. But Scania (heavy trucks) is found in Södertälje, buses in Katrineholm, and Volvo Construction Equipment at Eskilstuna, all in the greater Stockholm area (Katrineholm with a stretch), as is Bombardier, producers of railway equipment. Suppliers are found in many parts of the country, notably in Småland, renowned for its many SMEs. Roubert has analyzed a lift truck cluster in a small corner of Småland¹². Volvo also features a factory in Umeå up north, whereas Haldex, producing brakes and drives, is in the far south. There are quite a few smaller shipyards or boat manufacturers at the west coast. Saab Aircraft has its main location in Linköping (BT forklift trucks, now Toyota-owned, is nearby), between Stockholm and Småland, or between Stockholm and Gothenburg for that matter. There is also an important university department for design, HDK, located to Gothenburg, in addition to the Chalmers Institute of Technology. As noted previously, Porter looked upon clusters from a national perspective; rivalry between Volvo Trucks and Scania was one of his examples¹³ (as was the Swedish transportation equipment cluster).

Passenger car development especially, but also truck development, is shrouded in deep secrecy. The market must not be alerted to a model change until the manufacturer is prepared to produce and take orders. This may be true for many other products, such as computers or cell phones, but there is a difference in scale, both production (and network) wise and

when it comes to development time and complexity. The making of a new car model, for example, follows a particular cycle. At the same time, pressure is on to reduce cycle time, concurrent engineering one organizational tool, CAD-CAM a more technical one, possibly demanding organizational adjustment to reap the full benefits.

Transportation equipment producers rely upon outside industrial design consultancies as well as engineering firms for extra capacity at peak tasks along the development cycle to avoid hiring skilled expertise that would later be redundant when the process is in its next phase. They also rely on outsiders for particular sub-systems deemed less critical for overall product image. Furthermore, ideas are eagerly sought after, development departments keenly aware that outside people, with substantially different experiences, may provide important contributions. On the question about the number of alternatives designers would offer clients, the answer typically ranged from one to three. With the exception, however, for the case of new cars. Then at the early stages more like fifteen to twenty alternatives would be demanded.

If the third type of clustering will be demonstrated to be linked to one educational institution, design consultants working for transportation equipment manufacturers have often been employed by their now-customers. This is not necessarily very popular with those customers in the short term, that is, just when people have left, but in the longer run, it provides an efficient mechanism for knowledge, competency, and expertise transfer within the cluster. On a corporate level, consultancies would prefer to serve their customers worldwide; thus one has a substantial subsidiary in Brazil, where Swedish truck manufacturers have a stronghold, and also a smaller one in Detroit. Like Porter emphasized local, regional, and national rivalry as a mechanism for the development of world class

competitors, transportation equipment designers with a Swedish base attract customers from other countries.

Some potential automotive industry suppliers have mixed feelings about what they see as a bargain, or not, with the devil. Absolute legal and security demands associated with automotive products, and strict demands on quality, carry a cost penalty. Quality control programs like Six Sigma or ISO come with detailed demands on procedures, measurements, and auditing, creating an overhead affecting all the supplier's activities. Design firms wanting to get into the automotive loop have no alternative but complying with these requirements.

Another kind of standard than that of TQM (total quality management) or QFD (quality function deployment) is the one associated with resources for mockup and model production, prototyping, and sketching in various ways. Thus CAD software (possibly linked to CAM capabilities at production sites) must allow for seamless plugging into the customer's CAD-CAM systems (that is, the 'language' or standard of a specific software package, for example Solidworks, CATIA, Pro-E, Rhino, or Alias). But a capacity for modeling in clay and other materials may also be a compulsory, demanding requirement.

To avoid repetition, most of the discussion of the clustering criteria suggested in the literature, applied to the transportation equipment cluster, will take place at the end of the next section. The relationships in the two patterns are in many ways similar though engineering consultancies have internalized several of the external relationships of independent design consultancies. One item ought to be brought up specifically in connection with the transportation equipment cluster, however, and that is its obvious geographical dimension. The criterion of "co-location" even takes on a demanding character in the sense that independent engineering and design consultants often

are to work on the premises of the customer, an equipment manufacturer. Thus they operate in that customer's environment for quite some time, and then for another customer, possibly after some agreed-upon period of quarantining. Knowledge and technology transfer could hardly be more prevalent. Following the customer to Brazil or Detroit is another way of 'co-locating', of course. Clearly, this is a demand-driven cluster.

Engineering consultancies: a broader context

As everywhere, engineering consultancies in Sweden come in different flavors. Some may have a strong background in information technology from where they branch out into, for example, mechanical engineering. Others are involved in projecting large industrial investments, designing systems like factories or energy combines (and here it is really engineering design). Yet others have a firm basis in mechanical engineering, which is the (heterogeneous: from land-moving trucks to telephone exchanges) foundation for much of Sweden's economy.

There are two interdependent recent trends in this industry. One is to strengthen the engineering firm's hand in industrial design, the other to highlight this competency as an important part of a comprehensive offer. Three of the four large engineering consultancies offering industrial design belong, in part, to the transportation equipment cluster. One engineering group with strengths elsewhere has, during the period when we were interviewing, acquired a design consultancy strong on transportation equipment. The others have recruited capable industrial designers, sometimes acquiring their privately owned firms.

Product development, engineering design, innovation, and industrial design are becoming increasingly integrated. Thus the logic behind creating all-encompassing engineering consultancies; the alternative is of course partnerships

and networking, modes of operandi also existing. Confidentiality is at a premium when designing cars as well as when carrying out innovation work for a customer. Consequently, keeping information, models, mockups, sketches, designs, and indeed all considerations within one organization, and possibly at the very same premises, is often seen as of paramount importance.

Resources benefiting model production, prototyping, and sketching in various ways might comprehend CAD software (possibly linked to CAM capabilities at the production site), rapid prototyping equipment, capacity for the production of clay, plastics, or wooden models (where necessary), measuring equipment, and also intangible resources such as expertise. Quite a few customers demand design results delivered in the 'language' or standard of a specific software package. With a number of varying requirements like this, not all companies can afford to invest in an entire all-encompassing 'library'. Again, resorting to independent suppliers would be a solution, a potential caveat the confidentiality issue. One might regard engineering consultancies broadening their area of expertise as an attempt to combine better resource utilization with better service to the client.

The potential drawback of any integrated service package wherever is the risk (or just the risk of the client feeling) that the integrated firm pushes the customer to rely upon second order resources or is lured into using something unnecessarily - that is, overselling. But access to knowledge and competency is often a truly critical factor, and a corporation with a broad range of capabilities can do much to expose experts to each others' expertise and to develop and cross-fertilize within that broader range (the recent concern for creating and sustaining knowledge communities is an example of this). This may be one reason why 'industrial designers' are not necessarily trained in industrial design but rather as engineers, model

makers, glass blowers, architects, and other trades.

Even more than the design consultancies belonging to the transportation equipment sector, engineering consultancies have a - proven - ambition of going international. One reason is, again, that they want to accompany their customers to wherever they are active, so also forestalling large international (and foreign) engineering houses from winning the customer over. Another one is to further leverage those tangible and intangible resources. Obviously, this route entails international recruitment and exchange.

It is striking that several design consultancies and design departments within outside engineering firms see themselves as the one primary outside supplier or chief designer for prominent multinational concerns; interestingly enough, we discovered that several of them see themselves this way - for the same division of one and the same large customer. Furthermore, working with a certain set of tools, be they clay or a particular CAD software brand, is, as we have seen, an absolute prerequisite. Thus the criteria mentioned initially about *"buyer-supplier relationships, or common technologies, common buyers or distribution channels, or common labor pools"* would seem to be fulfilled. Design firms and engineering consultancies certainly belong to Porter's category of "supporting industries" though we cannot say if they are critical or just marginal. *"Technology transfer; knowledge transfer; and social infrastructure"* are other characteristics that apply.

Alumni of the University College of Arts, Crafts and Design

The University College of Arts, Crafts and Design (*Konstfack* in Swedish) is one of the oldest universities in Europe offering education in industrial design. In many countries, including Italy, industrial designers for a long time came out of other types of educational programs, such as architecture. As the name indicates, the

Swedish University College also trains artists so the learning environment and the 'college culture' is tilted somewhat towards art, form, and styling (nowadays even animation and animated movies are included, together with furniture, graphics design, and much more). Simultaneously, there has been an emphasis on function, relying upon such instruments as functional and value analysis, and on the practical forming, with an assortment of tools, of various materials. This basis contributes to creating a common framework for alumni from different classes.

After Digital Equipment Corporation was started by Ken Olsen and other engineers from an MIT laboratory, to be succeeded by a host of other new enterprises with the same pedigree, it became popular to name such ventures 'spin-offs'. General G F Doriot, the famous venture capitalist backing Digital Equipment, detested that denomination¹⁴. In his view, entrepreneurs came from many different vistas so why shouldn't some emerge out of MIT? Such criticism notwithstanding, spin-off has been established as a notion, well researched¹⁵.

Upon her or his exam, an industrial designer from the University College has four options: to pursue another career entirely, to join the design department of an existing manufacturing firm, to join an existing design consultancy, or to strike out on her or his own. Here of course some might opt for fashion or furniture, categories we have excluded from 'industrial design'. Students at the College may have another professional background before entering but obviously all alumni share the same educational basis. The clustering effect may be described as output-driven, the University College serving as a source of talent and talent networks.

New industrial design ventures often follow the same trajectory. Before graduating, a group of like-minded students pursue a company which they feel would need their competency in

(14) In an interview with Vedin in 1979

(15) Saxenian and Eliasson, quoted above, are among the many authors in this tradition

designing better products (services, systems, etc); quite often a 'customer' without any regular contacts with the industrial design community. The resulting graduation project serves as launching pad for a new firm started by students who feel that they would like to continue to work together, and the graduate project's customer (possibly newly converted to the utility of industrial design through the impact of that project), tends to stay with the new firm for many years.

Given the fact that many of Sweden's multinationals are headquartered in Stockholm, much of design tasks, even on an international level, are performed or at least coordinated from here. A number of University College alumni end up in such corporations, retaining contacts with their former class mates who might be called upon for work commissions. The social network is strengthened through common frameworks of methodology, shared experiences, and laboratory or workshop practices.

Alumni often start one person firms initially. Several such one man bands tend to group together to be able to invest in various costly resources, such as workshop space and equipment - absolutely necessary - and computer software - often of a particular make as the entrance ticket to certain large company customers. Contacts with the alma mater, the University College, is not lost. Rather frequently, industrial designers from consultancies 'rotate back' to their mater, serving as full-time professors there, though for limited periods - in addition to just occasional lecturing. Such practices obviously serve the wider designer community, making it possible for hard-won experiences from work life to affect curriculum and training, and allowing temporary professors time to reflect and access competency later integrated into courseware.

Of the clustering criteria suggested in the literature, "*common labor pool*" obviously applies. For an institution of

higher education, this is too broad, and too commonsensical. "*Common technologies*" or rather techniques or methods would also apply. The exchange between firms and the University College goes some way to fulfill the *co-location* criterion, and then also the one about "*technology transfer; knowledge transfer; and social infrastructure*".

Conclusions

The last two decades have seen voluminous work on interrelated subjects such as clusters, innovation systems, competence blocs, networking, and intangible resources¹⁶. As we have demonstrated, a small sub-sector of the economy such as that of Swedish design consultancies features three patterns of networking or clustering. They are variously related to customers, to the sharing of resources, including knowledge, and to competency acquisition, with a regional dimension to two of the patterns.

When it comes to conclusions, possibly the University College might do even more to strengthen alumni networks and to make them more visible earlier. Conclusions might also apply to the curriculum. Other design schools might learn from the experiences of the University College.

That engineering consultancies strive to acquire industrial design competency implies that they feel a strong market impetus for this. We have not studied in any detail mechanisms, problems, advantages etc implicit in this strategy, something which might be an interesting area for further research. A relative novelty is the fact that computerized design software allows for geometrical forms previously unattainable. This constitutes a strategic opportunity to explore, the concomitant problems, challenges, and effects on the supporting design consultancies (possibly the value chain) also worth studying.

To the surprise of many, the acquisitions of Volvo Car and Saab Car by Ford and

(16) Cf Hörte, S. Å. Op. Cit.

GM, respectively, led to more, not less design efforts being located to Sweden - despite the fact that Volvo, for instance, already had a design studio in California. This tells of the strength of the cluster. (A caveat: when this is written, loss-making GM Europe is considering whether and what to keep of Saab Car operations in Sweden.) It would seem vital for Sweden's future development to know to what extent industrial design plays just a subordinate role or rather that of an indispensable linchpin in the transportation equipment cluster. Such studies should preferably also include links to, for example, the central Transportation Research Authority, industrial research institutes, and universities - the same as when Chalmers Institute of Technology, the Department of Industrial Design at Umeå University, and others establish a program tailored to this sector. In other countries, the Lombardy design cluster is one that has been studied, and a Catalan study has been contemplated - efforts to learn from.

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Appendix 1 - Firms interviewed

A&E Design
Caran
Ergonomidesigngruppen
Formbolaget
Formtech
Go Solid
Hampf Design
Myra
No Picnic
Nya Perspektiv
Peekaboo Design
Propeller
Reload
Semcon
Stilpolisen
Struktur Industridesign
Ytterborn & Fuentes
White Design
Zenit Design
Ångpanneföreningen
Design Continuum
Ideo

The following companies relying upon internal design facilities have been interviewed

Electrolux
Softronic (computer software design, service design)
The following clients to industrial design firms have been interviewed:
ABB Robotics
Artemide
INSU Innovation Support
Tedak
The Swedish Telecommunications Museum/Telia Research AB
Senseboard
ETAC

“Är jag nu industriell formgivare?”

"Är jag nu industriell formgivare?"

Text: Björn Linn

Björn Linn är professor emeritus i arkitekturens teori och historia.

Regeringen har bestämt att 2005 i Sverige skall bli designens år. "Industriell formgivning" blev ett begrepp i svenskt medvetande vid slutet av andra världskriget, med en symptomatisk förskjutning från "vackrare vardagsvara" som var 1919 års slagord. Den nya termen var också titeln på en brevkurs utgiven av NKI-skolan 1951, som sökte fånga upp det växande intresset för det nya ämnet. De fem kursbrevens är ett dokument som kan berätta om i vilket sammanhang det kom in.

Man drog från början en klar rågång gentemot konsthantverket. Som Alvar Lenning vid samma tid (1950) underströk i Svensk Uppslagsbok, är formgivarens arbete av annan art än konsthantverkarens: "Dennes uppgift är såtillvida renodlad, som han arbetar 'direkt med ögat', d v s kan låta produkten växa fram mellan sina händer, under det att den industrielle formgivaren vid varje steg av sitt arbete har att tänka sig in i en rationellt ordnad produktionsgång." Nutida designmuseer överskrider gärna denna gräns och gör därmed uppgifter och problem suddigare. NKI-kursen gällde industriell produktion för

marknader, men den inkluderade (utan att uttryckligen klargöra skillnaden) två ytterlighetsfall av marknader och köpare: å den ena sidan allmänhetens marknad för seriefremställda vardagsting, å den andra specialisternas för maskiner och motsvarande, oftast byggda i mindre antal.

En av de tre personer som utarbetat kursen var Ralph Lysell, svensk pionjär i konsultrollen i AB Industriell Formgivning 1945-47. Han hade erfarenheter från USA, där begreppet *industrial design* formats i den framväxande marknadskulturen kring 1920 och lyfts fram som en livboj för den krisdrabbade industrin efter Wall Street-kraschen 1929, och han talade som övertygad praktiker och missionär. När han sade att yrket även fått fotfäste i Storbritannien, gjorde han dock situationen mer positiv än den faktiskt var. 1946 års utställning "Britain Can Make It" i London, ordnad av Council of Industrial Design (COID), var ett försök att lyfta fram god industriform som exportstödjande. I det kritiska läget med ekonomin körd i botten och marknaden ropande efter varor hade den dock inte lyckats övertyga industrifolk att skifta över till storstadskretsarnas intellektuella smak, hellre än att hålla sig till det man sedan gammalt var säker på. (Denna

intressanta historia redovisades i antologin "Design and Cultural Politics in Postwar Britain", Leicester University Press 1997.)

Det gällde nu att se om man skulle kunna etablera professionen i Sverige. Lysell förklarade formgivarens uppgifter väl i kurstexten: "att göra de många nyttotingen, som industrien producerar, mera praktiska och lätthanterliga, förläna dem en estetiskt mera tilltalande form, färg och struktur samt anpassa formen till funktionen, så att produkten i alla avseenden blev en harmonisk enhet." Han underströk vidare kraven på rationell producerbarhet och på marknadsundersökningar för att minska riskerna i lanseringen, varefter han sammanfattade att uppgiften var "att göra produkten ökat *säljbar* - med vinst". I alla stycken levde han kanske inte upp till sitt välbalanserade program, utan flyhäntheten som projektpresentatör kunde förleda honom till att (även i kursen) presentera projekt som inte var fullt genomarbetade.

Bland de kursansvariga fanns också Gregor Paulsson, professor i konsthistoria i Uppsala, tidigare direktör för Svenska Slöjdföreningen (nutidens Svensk Form) och generalkommissarie för Stockholmsutställningen 1930. Paulsson var den som före första världskriget hämtat hem från Deutscher Werkbund idéerna om att engagera konstnärer i industrin (för dess status och exportsiffror) och skapat ledmotivet "Vackrare vardagsvara". Som den store pionjären sågs tysken Peter Behrens, utbildad som brukskonstnär men från 1907 engagerad som både arkitekt och formgivare för den stora elkongcernen AEG. I den vedertagna historieskrivningen står han som den förste industridesignern. Principiellt representerade han som sådan snarast en nyorientering av artonhundratalets "dekorativa konst", frigjord från den stilhistoriska ornamentiken och underkastad ett krav på nyskapade, "moderna" former - men hans arbetssätt innebar primärt en form som läggs på

föremålet utifrån, en "formgivning endast för formens skull", som den klassificerades i kursbrevet. Metodiken skulle få sin stora, i och för sig produktions- och marknadsmässigt rationella tillämpning med de inklädande skalerna - mer eller mindre i strömlinjeformens tecken - från och med trettioalet, där årsmodeller lätt kunde växlas och stimulera försäljning och där den dolda konstruktionen inte behövde ges någon hög finish.

Men det fanns också parallellt en betydelsefull formtradition av helt annat slag, nämligen den som var grundad i upplysningstidens vetenskapliga instrument med deras enkla och precisa, sammansatta geometriska former i polerad mässing, slipat trä och andra motsvarande material, och med den tekniska funktionen som utgångspunkt. Den traditionen hade lett vidare till industrialismens verkstadskultur med verktyg och redskap formade för effektiva prestationer enligt kriterier som både tillverkare och användare var förtrogna med, och denna kultur skapade maskiner och lokomotiv, klipperskepp och ångfartyg. Den avgörande skillnaden i förutsättningar låg just i att dessa produkter tillverkades för fackfolk, för en marknad där brukssynpunkter avgjorde. I början av nittonhundratalet upptäcktes denna formvärld av arkitekterna som tog den till sig när de ställdes inför uppgiften att gestalta "vanliga" människors miljö, och eftersom den marknaden ännu länge var omättad och producentdominerad kunde synsättet tillämpas. Den svenska funktionalismen fann sin främsta ikon i en industriprodukt av denna typ - den självärde uppfinnaren J P Johanssons stora Triplex-lampa, en tak- eller väggmonterad arbetsplatsbelysning, ledad och utdragbar, som kring 1930 började dyka upp i bostadsrummen bland annat på Stockholmsutställningen.

Uppkomsten av dessa båda olika formtraditioner beror på att begreppet konst klövs i tidigmodern tid. Under största delen av mänsklighetens historia hade konst betecknat både en utvecklad

"Är jag nu industriell formgivare?"

mänsklig kunskap och dess verk - det konstgjorda, till skillnad från det naturgivna. En konstmästare var sålunda en tekniker inom bergsbruket. Det är i denna vida, aristoteliska mening som ordet konst förekommer i KTH:s motto "Vetenskap och konst". Men så formulerades begreppet "de sköna konsterna" - måleri, skulptur, arkitektur - vilkas företrädare med akademierna som sitt nya forum ville höja sig över konstfältet i övrigt, som lämnades åt "teknikerna". "Den dekorativa konsten" eller "brukskonsten" sökte hänga med uppåt så gott det gick, som ett halvsyskon.

Den gestaltning som utvecklades inom tekniken uppfattades av de sköna konsternas representanter som omedveten och en automatisk konsekvens av funktionskrav, men det var ett stort misstag. Konstruktörer kunde också vara estetiskt mycket medvetna. Verkstadskulturens formtradition företrädades av brevkursens huvudansvarige, Edvard Hubendick, professor emeritus i förbränningsmotorteknik vid KTH och en humanistisk tekniker av hög status. Han förde in i kursmaterialet ett antal exempel från verkstadsindustrin, framför allt Jonas Hesselmanns dieselmotor som han berömt redan i Uppfinningarnas bok 1925 för dess integrerade form. "Konstruktören har presterat en strålande 'industriell formgivning', som dessutom gjort maskinen särdeles vacker", skrev han nu.

Denna kunskapstradition med den skicklige konstruktören som också behärskar formen fick en av sina förnämsta representanter i civilingenjören Alvar Lenning, vars kritik mot formgivningens ytliga avarter refererades i kursen. Den "superkunnige" Lennings mest berömda arbete är Electrolux hushållsmaskin Assistent från 1940.

"Är jag nu industriell formgivare?" frågar kursförfattarna i sista brevet, och naturligtvis är de medvetna om att det inte är så. Det fordras både medfödda anlag och "träning parad med självkritik och självuppfostran". Men kursen hade

gett en orientering i ett område som i hög grad låg i tiden, i efterkrigstidens optimism om ånyo öppnade marknader.

I optimismen låg också en tro på att en storhetstid för god form låg inom räckhåll. "I våra dagar märks en tydlig omsvängning mot en bättre tingens ordning", säger skeppsbyggaren Gösta Kaudern i slutkapitlet. "De tekniska och estetiska kraven äro på god väg att förenas." Man anade ännu inget av den följande utvecklingen mot lådformade bilfärjor och containerfartyg, där maximalt utnyttjade dimensioner och rationellt byggnadssätt av minimalt styrande faktorerna - så som det också skulle ske inom andra områden av produktionen i samhället.

Strävan att forma en profession i Sverige fick framgång i och med att Föreningen Svenska Industridesigner (SID) bildades 1957. Förmodligen hade brevkursen inte haft någon nämnvärd betydelse, men den var ett led i populariseringen. Vid närmare betraktande ser man att dess analyser inte går särskilt djupt. Tredje brevet har som huvudtema stolar, och det är sannolikt att Gregor Paulsson här varit huvudförfattare. Här ges sålunda en "principfigur för stol" som visar ett upprätt sittande som vid ett matbord, och bredvid står "exempel på stol som nära ansluter till principfiguren" - men det är en bekväm stol av länstolstyp. Exemplet är inte valda så att de stämmer med varandra, och den studerande får ingen inträngande problemförståelse.

Tidstypiskt är det när man tar fram tidens moderna flygplan - en Spitfire, en DC-4 - som ett slags skönhets ikoner med "mjuka, rena former". Utvecklingen åskådliggörs med ett dukklätt biplan, en s k "box-kite" (låd Drake) från omkring 1910, och biologiska analogier dras med å ena sidan flygkonstnärerna tärnan och svalan, å andra sidan de "fula" och "primitiva flygmaskinerna" fladdermusen och skatan. Man har stannat vid utseendet utan att känna egenskaperna.

Lådramen var en mycket säker flygplans-
typ som föll långsamt om motorn
stannade (vilket var den största risken);
fladdermusen har som insektsjägare en
utomordentlig manöverförmåga. Det som
föresvävade kursförfattarna var ett
estetiskt ideal som låg i tiden.

För att illustrera en formgivningsprocess
framträder Ralph Lysell själv och berättar
om uppgiften att forma en kaffepanna
bättre än den då konventionella typen,
som hade ledat handtag över locket samt
en smal pip svår att göra ren. Han hittar
på ett löstagbart handtag, alltså över
locket - ett exempel på den tekniska
kneppighet som gärna fångat arkitekter
och formgivare - samt en vid pip, där man
inte behöver en flaskborste utan kan dra
igenom disktrasan. Nu var det så att all-
sedan tidigt trettiotal hade denna disk-
trasa blivit mål för en växande kritik av
hygieniska skäl, och när Hemmens Forsk-
ningsinstitut startade 1944 konstaterade
man att det på marknaden redan fanns ett
50-tal olika diskborstar och viskor (som
man sedan metodiskt provade för att få
fram en bra variant). Hushållsexperten
Kerstin Key hade 1940 sagt: "Den kvinna,
som i vårt, ifråga om god hemvård så väl
upplysta land, ännu håller fast vid disk-
trasan och icke vill lära sig att diska på ett
praktiskt och rationellt sätt, är så
efterbliven, att hon icke borde ha
rösträtt." Den omvärlden hade form-
givaren inte sett från sitt elegant rundade
bord.

Design research in Sweden: Findings from a National Survey

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This paper presents findings from a national survey carried out in Sweden during the fall of 2003. At the time, no systematic study had been made in order to gather information about current design research among the Swedish academic society as a whole. A survey was sent out by e-mail in September 2003 via the newly formed network named Swedish Industrial Design Research and Education Agenda (SWIDREA). Due to the dynamic growth of the network additional responses will be added until the end of the year, which means that it is not possible to present the findings at present time. Still, preliminary findings show some interesting points. First, there is evidence supporting the statements that design is a young research area. Within the design schools there are few doctoral students at present time and their supervisors are often found outside their own department. Some schools are just starting-up their doctoral education and have only one or very few students.

Second, due to the eclectic nature of the design area there are great varieties in topics, methods used, as well as structures of the

different doctoral programs throughout the country.

Third, the balance between active senior researchers and doctoral students are skew at present time. Findings show that there are almost a 50/50 relationship between active researchers/supervisors and doctoral students at present time. Together with the second statement, this means that there is also a severe lack of competent supervisors within the field at present time.

Conclusions point toward a situation where a rather large part of the Swedish design research that is carried out is done through doctoral student projects. It is also evident that there are a number of professors that has just, or not yet, started their own research projects, often lacking the tradition of doing research. Senior researchers within the field are mostly found at engineering- and business-schools at present time.

The survey also covered questions about planned future research projects within the design field. The paper ends with a discussion about research trends in the area and how they connect to the current research.

Compared to many other academic fields the design area is still perceived as young and highly dynamic. This means that the actors within the field of design cannot rely on long traditions that usually help forming a common theoretical foundation, terminology, definitions etc.

In Sweden, as in many other nations, there is a growing interest in design and what design can generate in terms of competitive advantage and economic growth for both companies and nations. Sweden is the country that invest most on R&D in the world seen as GNP/ capita (Proposition 2000/01:3) Year 2005 is declared to be the "Design Year" in Sweden, and there was even plans to label 2006 as "Export Design Year."

Nevertheless, the reality is that the academic research within this field is still in its bud. There are few researchers and doctoral students actively pursuing projects within the field. The present situation consists of a number of design schools that has developed good programs on their bachelor and master level, but are still lacking similar focus on the doctoral program. The small number of students, and the fact that they are spread all over the country, creates a situation that could be improved.

In order to form a support structure that will help developing the field in these issues the Swedish Industrial Design Foundation started the *Swedish Industrial Design Research and Education Agenda (SWIDREA)* in 2002. One of the key projects was the formation of a national doctoral program/school that could help and support the present and future doctoral students within the design field. The project's aim is to be open to all universities and colleges affiliated to the design area in Sweden and act as a useful network for all parts.

Aim & Scope

This study is aiming to explore the current situation of design research in Sweden. By mapping out the present situation it is possible to develop a suitable support structure in order to better expand the academic research within the field.

Motivation & Contribution

Within the area of doctoral education in design there are certain areas that have not received the same attention as others. In their guest editorial, Durling and Friedman (Durling and Friedman 2003) present a good foundation of how the field of doctoral education in design has evolved the last couple of years. They also note that *"the form and structure for the doctorate in design has not received the same amount or quality of attention"* (Durling and Friedman 2003:134). Artistic-based doctoral programs have been investigated in Sweden (Karlsson 2002), but no similar study has been made within the design area.

As was discussed at the 3rd Doctoral Education in Design conference in October 2003, the field of design also experiences the dichotomy of being either scientific or art based. (Or trying to cover both.) Since this is a research field that is still in its youth, it is important to share the collective trends and findings in order to improve the outcome of the doctoral programs in design in Sweden, as well as all around the world.

The structure of traditional doctoral programs places a strong emphasis on the individual. Studies have been done focusing on different aspects of the program like highly structures versus more flexible programs (see for example Pizzocaro 2003, Poggenpohl and Sato 2003, and Durling and Friedman 2003), or the degree of practical versus theoretical basis (Malfroy and Yates 2003).

Malfroy & Yates distinguishes in their study of two PhD-programs that there is a need to consider doctoral research as a group activity. The group was important

"both in the sense of the joint student/staff group that made up the blocks and seminars and the new knowledge that was seen by all as developing in this context, and in the sense of the overall profession or community group" (Malfroy and Yates 2003:128).

Another interesting aspect is the debate concerning the issue of awarding professor titles to individuals based on their artistic competence. The problem occurs when they are expected to supervise doctoral students without having done the proper training themselves. (See for example Durling and Friedman 2003).

Considering these trends and concerns in today's research community this study has the possibility to make a contribution to the knowledge base in this field.

The Study

During the second half of 2003 an e-mail survey was sent out via the SWIDREA network (approx. 120 names at the time). Respondents were also asked to pass the survey along to colleges at their department that might not be on the list. The objective was to map out who were active within the field of design in Sweden, what research they were doing, and if they were interested in acting as supervisor in the future. A distinction was also made between doctoral students and professors (researchers/supervisors).

The survey was structured into four parts. The first part asked for general information like affiliation, contact data etc. The second part asked for their field of interest, current research projects, and planned/future projects. The third part covered if they were active as supervisors, how many they tutored, and/or if

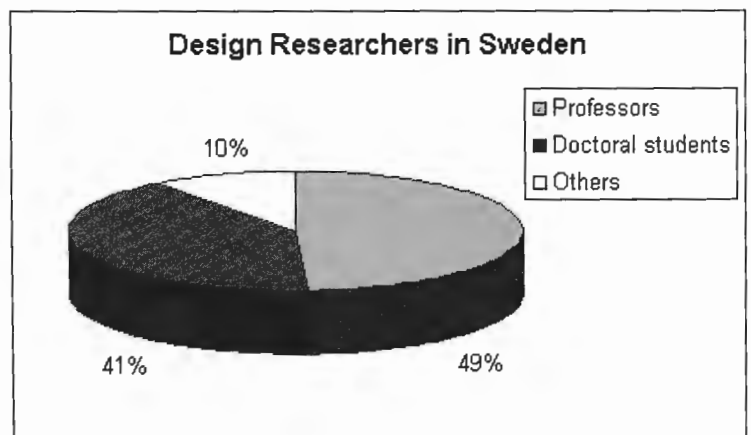
they were willing to act as supervisors in the future. The last part (not covered in this paper) asked both PhD-students and professors to state three different PhD-courses/topics that would add most value to their doctoral program in design.

By the end of 2003, 60 respondents had answered the survey resulting in a response-rate of approximately 50% based on the original list. Due to the fact that respondents have forwarded the survey to colleagues etc., the actual response-rate is lower, but also impossible to calculate. Since the survey is an attempt to find all involved in design research in Sweden, the response rate is of less importance compared to a normal survey, but nevertheless something to consider.

Findings

The design researchers in Sweden are in this study divided into three categories. First there are the professors. In this category you will find PhDs, and the equivalent to assistant, associate, and full professors. It is important to note that this category also includes professors without an academic doctorate degree. The second category is the doctoral students presently involved in a doctoral program. The third category is others. In this category you will find researchers currently employed at design departments that are neither PhDs (or equivalent), nor doctoral students.

Figure 1:
Design Researchers in Sweden



As can be seen in figure 1, the spread among the 60 respondents were as follows. 49% (29 respondents) were professors, 41% (24 respondents) were doctoral students, and 10% (6 respondents) were labeled as others.

The Professor

The respondents cover a vast and diverse field of expertise. They were asked to list a maximum of three different keywords as their field of expertise. As can be seen in appendix 1, the area of expertise covers a broad range of competences. It is also evident that not all respondents are researchers in design, but also researching about design, e.g., design management. There are also competences closely related to the engineering area like polymer materials.

Of the 29 respondents categorized as professors, six were not involved in any research project at present time. All of them are either newly graduated PhDs, or as in one case a newly appointed full professor. Among the ones currently involved in research, 17 could list two

research projects and 11 could list at least three different research projects.

Of the 29 individuals categorized as professors, 14 are presently involved in supervising doctoral students. 13 are not currently supervisors but responded that they were willing to act as supervisors in the future. Among the ones currently involved in tutoring doctoral students a list of how many students they presently supervised are presented in figure 2 below. As can be seen, many supervisors only tutor a few students each. Beside two professors tutoring seven students each, most of them have four or less at present time. Among the ones currently tutoring students, 7 were willing to take on others in the future, 8 were not. Interesting to note is that the answers on that question had no correlation to the number of currently tutored students. One of the professors presently tutoring 7 students answered yes, the one tutoring only one was not interested in taking on more in the future. The rest were divided evenly among the two groups.

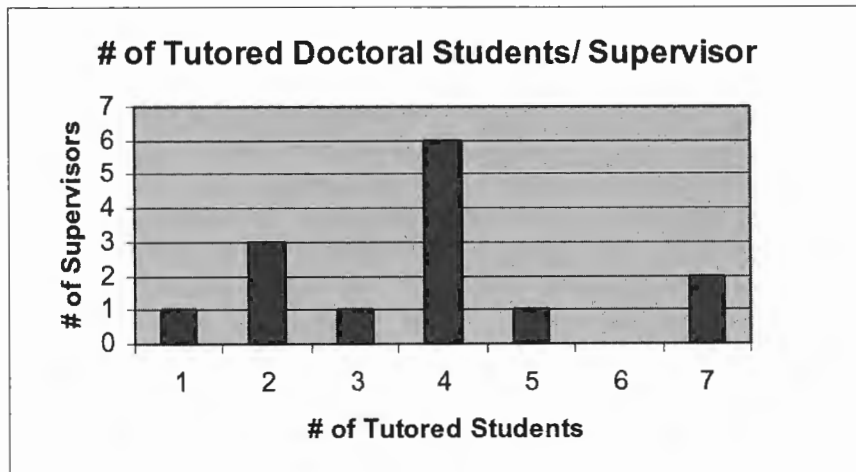


Figure 2: Number of Tutored Doctoral Students/Supervisor

The Doctoral Students

As was already stated earlier, 24 respondents were doctoral students. They are spread among 11 different locations in Sweden, from Luleå in the north to Malmö in the very south. 22 of them had a working title on their dissertation

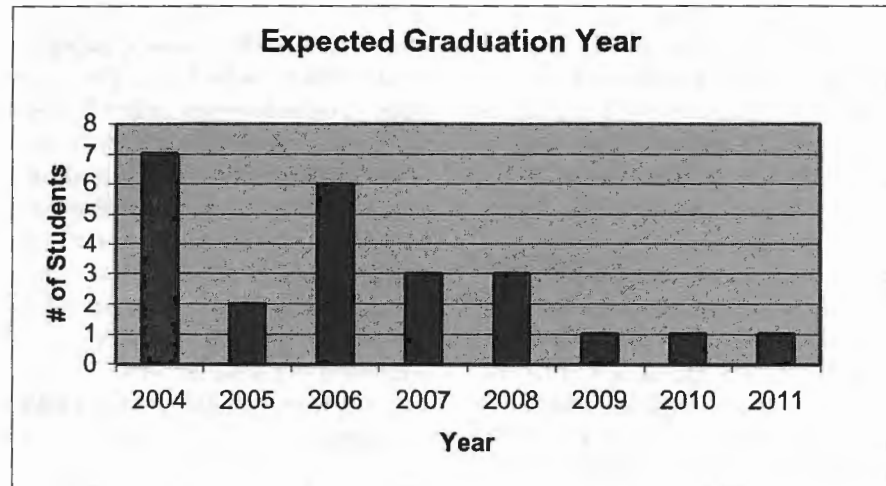
project, two were in the starting phase and had not yet formulated one. (For a full list of the dissertation topics, see appendix 2.)

Figure 3 below, presents the doctoral students' own prognosis of when they will finish their education. Due to the low

number of students, the variation between 2004, 2005, and 2006 can be expected. More interesting is that there are doctoral students admitted in the system today that are not planning to complete their degree until the years 2009-2011. The Swedish doctoral program is formally four years long. Even if the Swedish system up to this day has been highly flexible on this point, the signals from policy-makers are changing. There is presently a debate if the doc-

toral programs in Sweden should be shortened to three years instead of four. This is a clear indication that the politicians want to speed up the process. Today's system is also built on the principle that each doctoral student needs to be fully financed - guaranteed by the department that admits him or here into the program. With these factors in mind, it is rather surprising to see that there are doctoral students with a planning horizon of up to eight years.

Figure 3:
Expected Graduation Year



The Others

Six respondents could be categorized as neither professors nor doctoral students. Due to the small number of respondents and easy access to some of them, follow-up discussions were made. The typical respondent in this category has an MA in design, and is currently working on an applied research project financed by the industry. He or she is not interested in making an academic career at present time, but finds the research project challenging.

Conclusions

It is evident that the Swedish design research can still be considered both young and evolving. Research is found on a number of locations throughout the country, but there are few places where it is possible to state that there are enough

individuals to create a critical mass of knowledge within the design field. At five places there is only one single doctoral student in design at present time, and only two at two other locations. This is clear evidence that many schools and universities are just starting to build their doctoral program in design and has in some cases admitted their first students into their program.

The area of expertise and the list of dissertation topics show great variety within the field of design. There are projects *in* design as well as *about* design. This can be expected due to the eclectic nature of the field. Based on the tradition of being a rather "applied" area it is also positive to see that there are at least a few individuals focusing on developing theory and methods.

As can be seen in the first figure in this paper the amount of active senior researchers are just marginally higher than the

number of active doctoral students. This is not normal. The reasons for this are probably twofold. First, since the design area in academic terms is young, there are not enough academics graduated within the field to begin with. Second, due to the public focus and trends the design area has become fashionable in Sweden and has experienced a fast expansion due to extra resources from the government during the last couple of years.

This survey points to a situation where a rather large portion of the current design research is done via projects carried out by doctoral students. There are also a number of senior researchers not yet started their own research or are currently entering the field. The professors with many current research projects as well as many doctoral students to tutor are usually found at engineering or business-schools at present time.

Even if the sample undoubtedly is missing a number of Swedish researchers and doctoral students within the field of design, it is at least a first attempt to map the area. Altogether, this study concludes that the research community can benefit from a more structured network that can help creating a critical mass of knowledge as well as educating doctoral students as well as supporting supervisors/senior researchers in the area.

Future studies

There are plans to make similar surveys during upcoming years in order to map the evolution of the area.

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**Appendix 1 - Field of Expertise
among the Professors**

Aesthetics
Applied research
Cognitive psychology
Craftmanship & skill
Design
Design history
Design management
Design methods
Design process
HCI
Industrial design
Information design
Interaction design
Polymer materials
Product development
Product semiotics
Prototype-oriented design in interdisciplinary teams
Regional development and design
Sound design
Spatial configuration
Strategic design
Textile design
Theory of design
Theory of research and knowledge
User centred industrial design
User oriented design
User-centred product development
User-friendly/child-resistant products

Appendix 2

- Titles of dissertation projects

- Addressing the body: The study of the interface between clothes and the body
- Appearing Computing
- Cultural Aspects of Global Design
- Creative problem-solving and product design for young disabled adults in housing and society
- Design and Technology in Use
- Design for user satisfaction
- Design Methods for Human Factors in Product Development
- Developing models for three dimensional aesthetical theory and practice
- Industrial Design - Engineering Design Interaction: Studies of Influencing Factors in Swedish Product developing Industry
- Industrial Design - Rapid Tolling for Small and Medium Sized Enterprises
- Information design in three dimensional nautical navigation visualization systems
- Location, Navigation and Coordination: Studies of work practice and technology
- Making Sense - technology, health and product Design
- Participatory inquiry - collective design
- Recycling of paper in porcelain
- Regional development and design
- Spatial Appearance and Experience of Light Distribution
- Theories, methods and tools for designing haptic user interfaces

- Use of design in small wood manufacturing companies

- Visual thinking as didactic phenomenon in design education

- Warpprinted textiles

- What makes a good organization?

(Two respondents had not listed a title of their dissertation project.)

Nordic design research conference

May 29 - 31 2005, Copenhagen Denmark

~ In the Making ~

Announcement and Call for Submissions

Design is a restless field positioned as a productive practice in between *conceiving* and *making*. Design research is no less volatile, as it explores, explains and challenges what we know in and through design.

"**In the making**" is the theme of the first Nordic Design Research Conference. The conference invites contributions from researchers in universities, design schools and industry who share an interest in understanding and developing design as a trans-disciplinary practice that is always in the making. The scope of the conference reaches beyond the traditional design disciplines and includes other research areas with common interest in how people shape and make sense of things in an increasingly man-made world.

The conference directs its interest towards the diversity, challenges, emerging practices and understanding of design. Rather than searching for common definitions or a unified approach to design, "**In the making**" addresses the frontiers of design research as it is practiced in a broad array of academic fields. The conference theme reflects a range of issues that characterize design and design research today.

- *The role of the designer is changing.* Design processes are becoming arenas for change where many people collaborate, and designed objects play an even broader role as explicit socio-cultural manifestations of new possibilities.
- *The object of design is expanding.* We see the need for designers to understand

wider notions of user experience at the same time as to explore classical issues of form in light of new technologies and media.

- *The products of design practice are never conclusive.* People appropriate design artifacts in use whereby the social and cultural role and meaning of the artifacts undergo continuous change.
- *The conceptual foundations for design work are shifting.* Incorporating methods and approaches from areas such as the social sciences and humanities, the basic concepts we use to describe, understand, and reflect upon the design process are changing.

Call for Submissions

The conference invites papers, student papers, on-going work and tutorials, and aims to accommodate the many voices of design and design research in order for participants to share concepts and interests - including perspectives ranging from the humanities to physics, from ethnography to art, from engineering to marketing. Papers may cover experimental and exploratory research approaches to design and the production of knowledge. Papers may also be based on historical, historiographical, cultural or philosophical studies that hold qualified contributions to the field in terms of insights and ideas.

The conference will be organized to enable exchange and in-depth discussion of work presented. Papers will be presented in thematic break-out sessions facilitated

by experienced session chairs, in panels, and in one-track plenary sessions. Key-notes and panels addressing emerging or controversial issues are organized as one-track sessions to provide a common platform for discussing new directions for research.

Submitted contributions are subject to an anonymous peer-review process. Accepted papers will be published electronically on the conference website prior to the conference and in the conference proceedings.

Time and place

The conference will be held from May 29th to May 31st, 2005 at the Royal Academy of Fine Arts, School of Architecture in Copenhagen (www.karch.dk). On Sunday May 29th there will be an optional program of tutorials on design research, and there will also be possibilities for participants to organize informal workshops or meetings. Monday May 30th and Tuesday May 31st will be the main, full-day conference program, with a conference dinner on Monday night.

Type of submissions

The conference is open for papers, student papers, on-going work and (optional) tutorials that relate to the conference theme. All submissions must be in English. Submission templates will be made available to download from the conference website.

- *Papers* should be approximately 10 pages long and fulfill normal academic standards of concise argumentation, clear indication of how the arguments presented is grounded in the author's own work or in the work of others and traceable referencing of relevant related work.
- *Student papers* should be approximately 4 pages long and in principle live up to the same standards as full papers. This submission category provides an opportunity for students to enter the

conference even if their work is not yet mature enough for a full paper.

- *Running critique/on-going work* is a submission category inviting design professionals, researchers, and students to bring recently concluded as well as on-going work to the conference in order to get feedback from a panel of design experts. The submissions will be grouped according to suitable themes. The projects in each theme will form the basis for discussions among a panel of Nordic and international design experts circulating the exhibition area commenting on the projects throughout the conference. Submission format will be an A1 sized poster accompanied by a 2 page description of the design project or artifact.
- *Tutorials* are invited for the pre-conference program on Sunday 29th May. Tutorials should be half-day or full-day sessions that offer introductions to approaches, methods or techniques in design research to participants. Tutorials should be described on 1-2 pages describing theme, content and target audience.
- *Optional pre-conference workshops or meetings*: For the pre-conference program, everyone is welcome to organize workshops or other types of meetings. The program committee offers to distribute announcements and organize practical issues relating to these and will not review or select among the suggested activities.

Important dates

Deadline for all papers/on-going work/tutorials	March 1, 2005
Feedback to authors with suggestions for revision	April 1, 2005
Final paper submissions uploaded to website	May 1, 2005
Conference in Copenhagen	May 29 - 31, 2005

Organizers and Program Committee

The Conference is organized by an informal network of Nordic design researchers gathered in the conference program committee. The intention is that the Nordic Design Research Conference will be a biannual conference circulated among institutions in the Nordic countries. For this first conference, the Danish Center for Design Research, which is a joint research center for the Danish School of Design, the Design School in Kolding, the Aarhus School of Architecture and the Royal Academy of Fine Arts, School of Architecture, will be hosting the conference. All responsibility for the conference program will lie with the program committee, who will also be responsible for reviewing submissions.

Email contact information

General Information info@nordes.org
Conference Chair chair@nordes.org
Program Chairs programchairs@nordes.org
Student Track Chair studenttrackchair@nordes.org
Tutorial chair tutorialchair@nordes.org
Running Critique/Exhibition Chair exhibitionchair@nordes.org

Website

www.nordes.org

Designkonferenser 2005

Nedan finns ett axplock av designkonferenser under 2005. Fler konferenser är planerade, men här är några. Kalendarium finns på www.designaret.se och www.svid.se.

Mars

- 9-11 The 9th European International Conference on Design Management i London:
www.dmi.org
29-31 The 6th European Academy of Design EAD06 i Bremen:
www.ead06.hfk-bremen.de

Maj

- 24-26 Destination Design Conference 2005, Åre:
www.destinationdesign.se
29-31 Nordic Design Research Conference, Köpenhamn:
www.nordes.org

September

- 21-28 ERA05 joint congresses:
www.era2005.com
21-24 Pre-congress conferences:
Design without border i Oslo
Design for everyday life i Göteborg
Joining forces i Helsingfors
25-28 ERA 05 World Design Congress i Köpenhamn
The Changing Role and Challenges of Design

Oktober

- 20-21 Design för entreprenörskap, design för utveckling, Växjö:
www.ehv.vxu.se
23-26 The 30th International Design Management Conference i Chatham,
Cape Cod, USA: www.dmi.org

November

- 14-16 Future Design Days, Stockholm: www.futuredesigndays.com

Svensk Industridesigns bokförsäljning

Beställ via webbplatsen www.svid.se under Läsvärt, alternativt telefon 08-783 80 00, fax 08-661 20 35 eller e-post post@svid.se

Den socialt formgivna produkten

Författare: Ulf Mannervik

Utgiven 1997 Chalmers tekniska högskola, exp. för Form och Arkitektur

Ser vi industriell formgivning som en social förändringsprocess, framgår det att en rad olika personer påverkar en produkts form, personer med olika prioriteringar kring problem som den skall lösa. Produkten är socialt formgiven i bemärkningarna att produktutvecklarna skiljer sig åt i sina föreställningar om produkten och dess form växer fram under deras samverkan. Som social förändringsprocess är formgivningen inte begränsad till en enskild och skenbart fristående process, utan måste förstås i ett sammanhang där tidigare och parallella produktutvecklingsprocesser ingår. Produktutvecklarna knyter sig samma i olika allianser som sträcker sig över historien och korsar det enskilda företagets formella gränser. Studien visar bl.a. utmaningar som produktutvecklare behöver kunna hantera för att utveckla en väl sammanhållen produkt. Dessutom visar den villkor som industridesigner måste möta för att kunna skapa gehör för sin kompetens och få utrymme för sitt bidrag inom produktutveckling.

Pris: 176 kronor exkl. moms + frakt

Design

Utgiven 1985 av Design Center Stockholm

Huvudtemat för boken är design i den industriella processen. Boken förklarar vad industridesign är, presenterar dess pionjärer och den internationella konkurrenssituationen. Den redogör för attityder till design bland små och medelstora företag och tar upp relationen mellan design och samhällsekonomi. Tolv svenska företag från den stora koncernen till fåmansföretaget, intervjuas om hur de använder design som konkurrensmedel. Nio industridesigner med olika specialiteter belyser sina erfarenheter från samarbetet med industrin. Boken Design var den första publikationen från Design Center Stockholm och möttes med stort intresse 1985 när den kom ut. Eftersom den är en unik och innehållsrik sammanfattning av industridesignerns möjligheter att ge industrin ökad konkurrenskraft och brukarna mer för pengarna fortsätter vi att använda den √ giltigheten finns kvar.

Pris: 75 kronor exkl. moms + frakt

Design av företags- och produktnamn

Författare: Jens Bernsen

Utgiven 1994, Svensk Industridesign/Industrilitteratur, Stockholm

Ett bra namn är inköpsporten till identifikation, igenkännande och förståelse. Ett dåligt namn kan medverka till att man blir förbisedd eller feltolkad. Ett bra namn ger ett företag eller en produkt en god start, kanske även ett gott liv. Ett dåligt namn är en belastning. Utvecklingen av ett namn på ett företag eller en produkt är en designuppgift i sig. Boken kartlägger beslutspunkter som ligger bakom valet av namn och anger kvalitetskriterier för denna designuppgift. Boken är både på svenska och engelska.

Pris: 50 kr exkl. moms + frakt

Design for Product Understanding

Författare: Rune Monö

Utgiven 1997 av Liber

Industridesignerns uppgift är att forma tingen så att vi förstår hur de ska användas. Boken lägger därför tonvikten på produkten som ett tecken, dess budskap och kommunikativa betydelse. I flera avseenden bryter boken ny mark på produktsemantikens område. Design for Product Understanding är nödvändig vid utbildning av industriella och grafiska designers och ovärderlig för alla, som på ett eller annat sätt arbetar med våra nyttotings gestaltning. Den vill också öppna dörrar ut till vidare forskning på ett fortfarande jungfruligt område.

Pris: 288 kronor exkl. moms + frakt

Designer Carl-Arne Breger

Författare: Susanne Pagold

Utgiven 1996 av Andrén Art Production

Carl-Arne Breger, Det allmängiltigas mästare, gör vanliga saker, säger han själv. För så många som möjligt, annars blir det inga jobb och inga pengar. Carl-Arne Breger har designat en stor mängd bruksföremål av alla slag, diskborste, toalettstol, cykelpump, plasthink, smörpaket, saltströare, hammare och mycket annat. Underhållande och lätt nostalgiska texter av Susanne Pagold.

Pris: 50 kronor exkl. moms + frakt

Handla

Utgiven 1997 av Tullbergs kultur & reklambyrå

Boken handlar om förändring, välfärd, arbete, lärande, konsumtion, arkitektur, design, kultur och framtid utifrån 1930-talets bok "acceptera". Författarna tar upp olika faktorer som styr utvecklingen av arbetslivet och för fram visioner kring lärande och förståelsen av kopplingen människa - maskin.

Pris: 368 exkl. moms + frakt

Ekodesign/Ett steg mot en hållbar framtid

Produktion: EkonoMedia Affärspress AB

Utgiven oktober 2000 Projektledare: Christer Ericson och Hans Frisk

Industridesign är ett kraftigt verktyg i kampen för att rädda miljön. Förr fokuserade man på utsläpp, förpackningar och sopsortering. Nu står det klart att miljötänkandet måste börja redan på ritbordet. När produkten lämnat fabriken är det för sent. 1998 startade projektet EkoDesign, initierat av Svensk Industridesign med finansiering från NUTEK, Näringsdepartementet, EU:s Småföretagsinitiativ och deltagande företag. Elva mindre och två större företag har med hjälp av specialutbildade industridesigner och miljöspecialister gått igenom och miljöanpassat sina produkter och olika arbetsmetoder. Målet med EkoDesign-projektet har varit att minska den totala miljöbelastningen med 50 procent- under tillverkningen, när produkten används och när dess livslängd är slut. Ett mål som vi lyckats uppfylla.

Pris: 50 kronor exkl. moms + frakt

Ett steg till mot en hållbar framtid

Produktion: EkonoMedia Affärspress AB

Utgiven september 2003 Projektledare: Christer Ericson och Hans Frisk

Ett steg till mot en hållbar framtid (engelska - Another step towards a sustainable future). Flertalet av nystartade företag idag är tjänsteföretag. Vad gäller traditionella produkter anser idag många att design ökar konkurrenskraften. Design skapar attraktiva produkter som klarar internationell konkurrens. Finns det då någon som arbetar med produktutveckling av tjänster och där användaren sätts i fokus som i fallet med vanlig produktdesign. Vi menar att detta inte sker idag. Se exemplet mobiltjänster. Hittills har dessa tjänster inte anpassats i någon större omfattning till slutanvändaren. I denna rapport har vi tittat närmare på insamling av avfall och vård av psykiskt sjuka och där resultaten är mycket positiva.

Pris: 50 kronor exkl. moms + frakt

Resa i design

Författare: Lisa Warsén och Per Leander

Utgiven 1999 av KFB, Kommunikationsforskningsberedningen

KFB har under ett antal år finansierat ett forskningsprogram om industriell design inom kollektivtrafiken. Detta arbete är nu avslutat och finns sammanfattat i en handbok, som heter Resa i design. Boken vänder sig till alla som arbetar med att förbättra kollektivtrafiken. De som arbetat inom programmet har funnit att industridesign är ett utmärkt verktyg för utveckling och management när det gäller såväl tjänsten som alla dess olika beståndsdelar. Design är synlig och riktar sig till både resenärer och personal. Dessutom manar design till helhetssyn. Läs boken Resa i design och få inspiration och idéer. Boken behandlar utformning av fysiska produkter, rumsmiljöer och information och hur man skapar en fungerande helhet med människan i centrum. Den beskriver både genom sin huvudtext och ett stort antal exempel hur design genomförs och hur design kan användas. Det handlar om att färdas väl. Om välfärd!

Pris: 350 kronor exkl. moms + frakt

Sverige i god form

Författare: Ann-Kristin Myrman

Utgiven 2000 av LO, Landsorganisationen

Vi vill med skriften Sverige i god form bidra till en ökad diskussion om formgivningens betydelse för sysselsättningen och utvecklingen av svenskt näringsliv. Vi tror att det finns stora utvecklingsmöjligheter för företag som satsar på en genomtänkt formgivning. Det kan leda till sysselsättning, utveckling av arbetets innehåll och bättre produkter. Det finns många aktörer vid en produkts tillkomst: formgivaren, konstruktören, som ibland är samma person som formgivaren, företaget, de anställda, den fackliga organisationen, köparen och brukaren. Alla kan bidra med mer än de gör idag. Alla har kunskaper som inte utnyttjas och inte samordnas. Vi tror att det finns både kunskaper och intresse inom våra egna led som inte tas till vara. Därför vill vi med Sverige i god form framför allt stimulera facket och fackets medlemmar att fundera på och undersöka om en satsning på formgivning skulle kunna bidra till att utveckla det egna företaget.

Pris: 32 kronor exkl. moms + frakt

Tänk på saken/Design from western Sweden

Författare: Folke Edwards, Gunilla Grahn-Hinnfors, Torsten Hild, Ingrid Sommar och Anders Westgårdh

Utgiven 2000 av Nordbok Publishing AB

År 2001 är ett av regeringens utlyst år för arkitektur, form och design. För att lyfta fram designlänet Västra Götaland utkom boken "Tänk på saken", ett praktverk i ord och bild om västsvensk design. Närmare 100 utvalda västsvenska föremål, som är designade och/eller producerade i Västsverige. Från bilar till porslin, från möbler till ostar, från servetter till motorsågar. En del föremål är klassiska, andra är samtida. Boken skall skänka kunskap kring design och inspirera till ökat designtänkande bland företag, myndigheter och organisationer. Boken skall vara en upplevelse för dem som tar del av bokens texter, bilder och grafiska form. Finns både på svenska och engelska.

Pris: 250 kr exkl. moms + frakt

The Human Dimension

Utgiven 1994, Svensk Industridesign, Stockholm

I oktober 1994 arrangerade Svensk Industridesign, Arbetsmiljöfonden och Sveriges Tekniska Attachéer utställningen "Den Humanistiska Dimensionen" i Milano. Utställning visade 70 svenska företags produkter, utvecklade med omsorg om dem som skall använda dem. Ett antal namnkunniga personer, t ex Gustaf Rosell, Kerstin Wickman, Anty Pansera och Maria Benktzon, ger sin syn på denna humanistiska dimension, ett förhållningssätt som gör Sverige unikt inom användarriktad produktutveckling. Boken är på engelska.

Pris 50 kr exkl. moms + frakt

