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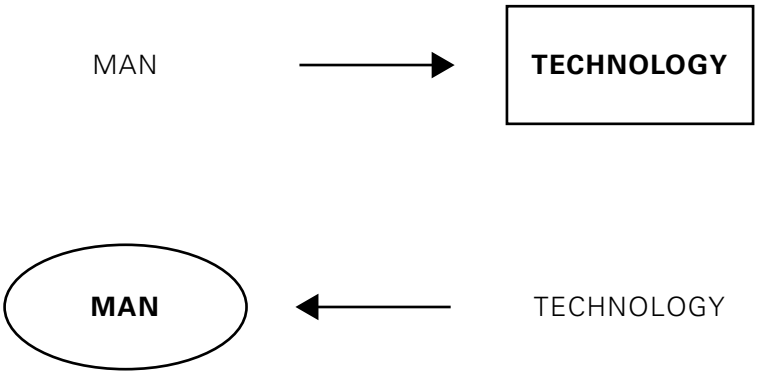


Preface

Design for Social Innovations

Towards Human Centered Design

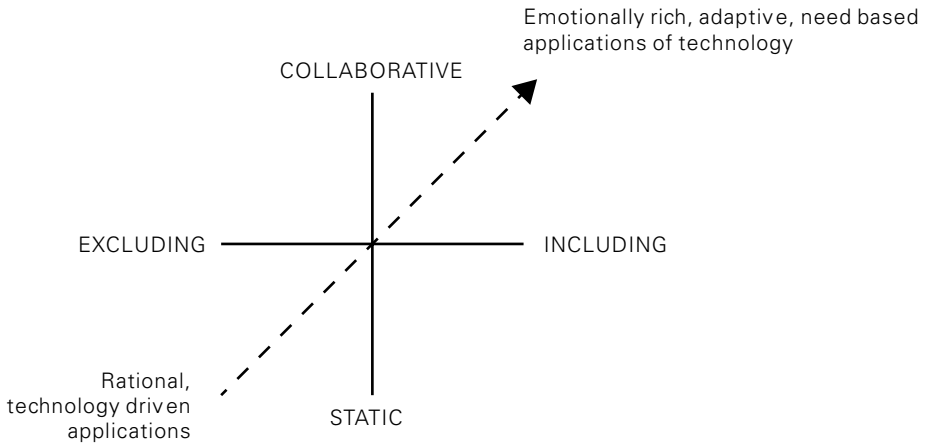
The flow of technological inventions has marked the development of the past decades. We live in a world imbued with technology and goods. The effect they have had on our way of life, our behaviour and our well being has been undisputable, for the greater part positive. However, increasingly critical questions are heard: does technology force people into developing to something that they do not actually wish for and is a new class society being born: a privileged group, that is able to benefit from the possibilities offered by technology and a disadvantaged group for whom the complications of technology are a daily frustration and an insurmountable obstacle?

Along side technological innovations, discussions about social innovations have risen, "design for all". The question here is about a change of perspective: instead of people having to adjust to technology, development is wanted where technology bends to the needs of people. This is to say that instead of a technology appeal, more humanitarian development is wanted: intelligible, easily usable, pleasurable and services and products that serve people in their everyday needs. (Chart 1: A paradigm shift)

Social vrs. technological innovations

The development of technology (information and material technology, industrial technology, logistics etc.) creates the possibility to combine mass production and the individualization of services/products. Products and services become more easy to use and the emotional factor (the use may be pleasurable) beats the existing and controlling frustration factor (failure in use is frustrating). Products and services may also be personified (personal user profile) according to each persons wishes, needs and operating situations.

The new possibilities of technology and the humanitarian planning open possibilities to build the society and services, which treat people equally. Seeing people's different needs as a social and economic



△ **Chart 2. Towards a socially innovative society – mass customisation and personalization.**
◁◁ **Chart 1. A pradigm shift – from technology driven thinking to user centred design.**

resource brings social innovations to the core of development. Through equality a central societal force is formed. (Chart 2: Towards a socially innovative society)

How to facilitate creative interaction

The humanitarian planning thought demands taking into consideration many different fields of science. By using the information of different fields of science, the core factor of companies' competitiveness is formed. The information of social science, cognition and behavioural science, design, the different areas of technology, anthropology, consumer research, business economics, marketing etc. need to be taken advantage of simultaneously. The adoption of creative team work and the mastery of a planning process that integrates information from different fields become essential.

New products and services are expected to support communality, increase peoples creative interaction and collective creativity. In addition to the functional use of physical products, issues such as the products ability to communicate its meaning and their ability to offer solutions to people's everyday problems are emphasized. (Chart 3: The space and the "tools" facilitate creative interaction).

Design for a socially innovative society

In order to turn the technologically and financially innovative society into an inclusive and socially innovative society we need to turn social and physical differences into sources of innovation and see equality as a main resource of the society. One way to achieve our aim is to add dynamism, enrich our daily lives and generate unconventional solutions. This can be done by exploiting technological possibilities and making the environment more reflective. As well as increasing support for co-creation, we need to recognise the importance of the emotional and also create ways to increase multidisciplinary teamwork.

What can design do?

If we agree with the new direction of our societies we need to answer the questions: what can design do (and what does it have to learn) to help this development and what is the role of academic institutions in developing socially innovative societies? Design possesses some unique areas of skills, methods and knowledge. It can create visionary scenarios and facilitate strategic conversation and through these develop in new directions. Design can also create a synthesis of complex data and improve decision

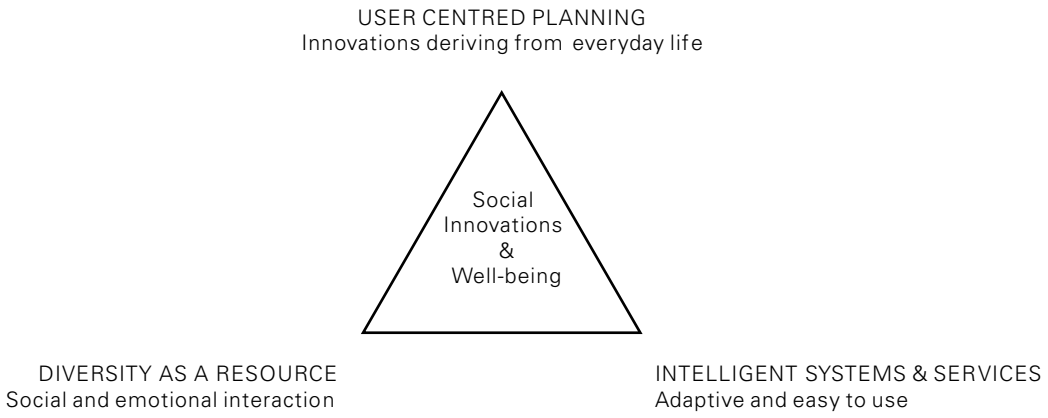


Chart 3. The space and the "tools" facilitate creative interaction – a need for dynamic and reflexive environments.

making (giving support to multidisciplinary teamwork). We need to learn to design with customers/users by using design tools to support team-based co-creation which give a visible form to the ideas of a team and illustrate possible solutions. The autonomy of universities gives freedom to explore a wider world of ideas, which are an important "critical voice".

Design's democratic role

Design is a democratic art which tries to improve the quality of life of all citizens by using the possibilities of technology and industrial production. Art and design give meaning to technology. Paper would be just raw material without poetry, words or pictures printed on it.

VALiD was very valid

The Valid Conference of Cumulus in Tallinn meant a turning point for Cumulus. The number of member institutions grew from 37 to 57 including first non European members. This dynamic development will continue and Cumulus will have more European and oversees members in the future. It will become a true "voice of design education and research". Even if it is called European, it will be international.

The theme of the conference deepened our understanding of the human and societal trends which we should take in consideration when planning education and research. The conference broadened to mission of Cumulus.

On behalf of all participants and the Cumulus Executive Board I wish to extend my warmest thanks to Ando Keskküla, Tiia Vihand and their team of the generous hospitality and the excellent management of the event.

Prof. Yrjö Sotamaa, IDSA, SIO, ORNAMO
President of Cumulus, European Association of Universities and Colleges of Art, Design and Media
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Welcoming Address of the Estonian Parliament

Dear guests,
Today's conference is not just another art world event. It is an important milestone for the Estonian economy. Yes, I am here to say some words about economy. Not a discourse nor a deconstruction nor the other big words commonly associated with artists coming together. Economy. The part of life that gives us work and food and shelter. Because I see a very clear connection between better design and better economy. And thus, better life.

In today's world, the ability to manufacture something is not enough to get a competitive advantage. Manufacturing can always be outsourced. The idea of one huge factory – presumably somewhere in South East Asia – that would meet the whole world's need for some item is not too far fetched any more. Take computer parts – they are produced in two or three factories for all the competing trademarks that exist!

So, are we destined to remain off the train? Of course not! I strongly feel that this new economic model gives a new boost to those who are creative, flexible, and out-of-the-ordinary. No matter whether you come from a big or small nation, if you have a great idea you will win. Ideas and concepts will be the competitive advantage, instead of production facilities. The big challenge will be to give the production facility a better task than your competitors do.

And this is where design comes in. Today, you will probably be discussing more than once that actually there are so few well-designed , usable things around us. Things that are made for people, including those people who are a bit clumsy or have weak eyesight or who are just ordinary people like you and me. Actually, all brilliant ideas are simple – just go and make things that are good to use!

Of course, it is easier said than done. But seeing so many professionals here today, and professionals with the right thinking, gives me a very good feeling. Thank you all for doing what you do, and please remember, dear members of the design community – the economy of Estonia will in part depend on your bright designs!

I declare the Value In Design conference open and wish you all the brightest ideas!

Ene Ergma
President of the Parliament of the Republic of Estonia
e-mail ene.ergma@riigikogu.ee

VALID – VALue In Design

I am very glad that Estonian Academy of Arts has a chance to host this year's Cumulus meeting, and I'm very glad to see so many people here. EAA has been a member of Cumulus network since 1997, we have seen the network growing and become an association. Cumulus has always meant a lot for our university.

I'd also like to welcome everybody to Tallinn, not only to Estonian Academy of Arts. If this is your first time in Tallinn, I hope it wouldn't be your last.

The title of this conference is VALID: disabeling disablement, enabeling enablement. We have tried to create a program that takes into account that this year has been designated the European year for people with disabilities by the EU. With this programme we have tried to expand the scope of understanding of what could constitute disability. That's why we have tried to choose a diverse panel of speakers who will look at disabelment/enablement from political, economical, sociological, technical and environmental perspective.

I hope that we will have number of lively and even provocative discussions over next 3 days. I will look forward to it.

Thank you!

Prof. Ando Keskküla
Rector, Estonian Academy of Arts

Culture and Globalization: The Fashion Industry as a Case Study

In this paper, I examine the production and dissemination of fashion and clothing as a form of cultural globalization. Cultural globalization – as opposed to economic, political, or technological globalization – refers to the transmission or diffusion across national borders of various forms of media and arts, including decorative or applied arts. How has globalization affected the fashion and clothing industries? What are the major consequences of globalization in these industries?

My objective in this paper is: (1) to review the principal theoretical models that have been used to explain or interpret the phenomenon of cultural globalization; and (2) to discuss how these models apply to the globalization of fashion and clothing industries. The four models I discuss are the following: the cultural imperialism thesis, the cultural flows or network model, reception theory, and a model of national and urban strategies toward cultural globalization. The phenomenon of cultural globalization is sufficiently complex that no single theory can be expected to explain it adequately.

The fashion industry and cultural imperialism

The best known model of cultural globalization is *cultural imperialism* theory. Cultural imperialism is defined as a kind of cultural domination by powerful nations over weaker nations [1]. The effects of this type of cultural domination, reflecting the attitudes and values of Western, particularly American, capitalist societies, are viewed as extremely pervasive and as leading to the homogenization of global culture. The imposition of cultural imperialism requires an organizational infrastructure. Cultural imperialism has two components: powerful conglomerates that dominate cultural industries and cultural images disseminated by these companies to large numbers of consumers. In the fashion business, this phenomenon can be observed at two levels: in the luxury fashion industry and in mass markets for fashion-oriented clothes and for specific items, such as sports shoes.

The European luxury fashion industry which is centered in France and Italy is currently dominated by two large French conglomerates, which own companies belonging to most of the leading designers in France, Italy, England, and, to a lesser extent, the United States. Since even very small fashion firms must sell their products in countries all over the world, globalization gives an advantage to large firms that have ample funds to invest in stores and distribution systems in all the major world markets. This is the culmination of a process that has been taking place since the 1940s [2] in which ownership of fashion firms has passed from designers to businessmen.

The fashion-oriented clothing market is also dominated by a few large firms, such as Benetton in Italy and Gap, Guess, Esprit, Tommy Hilfiger, and Levi Strauss in the United States. The global market for athletic shoes is dominated by Nike, Reebok, and Adidas. These companies produce their products in buyer-driven commodity chains in which large retail and brand-named merchandisers in advanced countries design products and set up decentralized networks of companies that produce them in developing countries [3].

Along with their products, these companies sell "an ideology, set of values, and life style" [4]. In postmodern

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1 Tomlinson 1991.
2 Crane 2000.
3 Gereffi 1994.
4 Rabach & Kim 1994, p. 137.

societies, consumption of many products is driven by the consumption of signs associated with products rather than by needs for the products themselves. Manufacturers of fashion-oriented clothing, such as Gap and Benetton, engage in expensive and elaborate advertising campaigns. Companies that sell sports shoes rely almost entirely on advertising campaigns to create the value of the product and to attract customers [5].

How can the images disseminated by these companies be characterized? The social and political implications of their advertisements are generally subtle rather than blatant. These types of advertisements appropriate ideas and images that are already circulating in national and global cultures and that they either exploit or de-politicize. At least five types of ideas and images can be identified:

1. Exaggerated sexuality;
2. Transgressive sexuality;
3. Representations of the body as an instrument for athletic prowes;
4. Representations of race and
5. Representations of social, economic, and political issues.

In the case of luxury fashion, the images used to sell these products appear to have undergone a transformation in recent years. The image traditionally projected by companies that produced haute couture, the earliest form of luxury fashion, was that of refinement, subtlety and perfect workmanship [6]. The images projected by some of the recent fashion shows and advertising for the lines of ready-to-wear clothes produced by luxury fashion companies no longer refer to these traditional values of haute couture. For example, following a recent trend toward the use of increasingly sexually explicit images in advertisements, two luxury fashion firms, Gucci and Yves Saint-Laurent, have shown advertisements with either full or virtually full frontal male and female nudity [7].

The success of Nike and other firms selling athletic shoes in the 70s and 80s has been due to their capacity to exploit the "fitness boom", growth in the popularity of jogging, running, and exercise [8]. The values promoted by Nike and other firms selling athletic shoes include self-improvement, competitiveness, and health [9]. Representations of muscled and glowing bodies have been very important in many of their ads. Nike has used celebrity athletes, both white and black, to associate their shoes with athletic prowess and success. Television ads have shown athletes running and playing sports, often exerting their bodies to the utmost in order to achieve succeed. In many of the ads run by fashion-oriented clothing companies and by athletic shoe companies, race is an overt or an underlying theme. Images of black celebrity athletes are used as a way of associating their success with the product.

Another means of attracting attention and attributing value to products is by associating them with references to pressing social, economic and political issues that are being widely discussed in the media. This approach has been used by Nike and Benetton. Nike ads have alluded to social problems relating to HIV-AIDS, physical disabilities, aging, gender equality, and the plight of inner city children. These types of ads have been relatively uncontroversial, presumably because they have conveyed an atmosphere of authenticity. Nike's identification with middle class values of achievement, discipline and teamwork probably served to reduce the amount of controversy that might have been caused by these ads.

Benetton ads have tackled social, political, and economic themes but in a very different manner. Beginning in 1989, they have presented highly ambiguous and controversial images that can be interpreted as comments on, for example, racial inequality, HIV-AIDS, deterioration of the environment, and the plight of refugees [10]. The Benetton campaign is notably less upbeat and optimistic than the Nike campaign. This in part explains why the Nike ads are deemed acceptable while the Benetton ads have tended to be received much more negatively. Benetton's failure to provide information or advice

5 Goldman & Papson 1998.
6 Roux & Floch 1996.
7 Elliott 2003.
8 Korzeniewicz 1994, p. 254.
9 Ibid., p. 254.
10 Tinic 1997.

about the social problems they depict in their ads (for example, disease prevention or volunteer programs about AIDS) has made them susceptible to the charge of engaging in exploitation and cynical manipulation.

Fashion and clothing industries as networks: regional alternatives to western fashion industries

In contrast to cultural imperialism theory in which the source of cultural influence is Western civilization while non-Western and less developed countries are viewed as being on the periphery – as the receivers of cultural influences – the cultural flows or network model offers an alternative conception of the transmission process, as a set of influences that are not necessarily originating in the same place or flowing in the same direction. In this model, cultural globalization corresponds to a network with no clearly defined center or periphery [11].

This model suggests that two contradictory trends are operating in the phenomenon of cultural globalization. On the one hand, international conglomerates are extending their influence and control over certain types of global culture. On the other hand, the increasing importance of regions as producers and markets provides support for a network model of cultural globalization. As we have seen, the global clothing industry consists of global commodity chains which superficially resemble networks but in fact conform to a core-periphery model since power is concentrated in companies located by advanced countries. Unlike media industries where companies in the Third World are beginning to produce and export television programs and music, most Third World companies make little contribution to the fashion industry, other than as suppliers of cheap labor for Western companies and exporters of cheap clothing to the West.

To the extent that a global network exists in the fashion industry it is to be found among a small number of advanced countries (such as France, Italy, Belgium, Great Britain, Germany, Spain, the U.S., and Japan) that produce designer clothes and sell them to each other, as well as to a substantial number of other countries where similar companies would be unable to raise the high levels of investment necessary to compete in these markets. Fashion produced in each of the countries in the network tends to have specific features related to specific characteristics of these countries, such as the history of the decorative arts, the roles of elites and of urban subcultures, and the size and nature of the market for designer clothing.

Global fashion cultures and reception theory

A third model, *reception* theory, has been used to explain responses to cultural globalization by publics in different countries. This theory hypothesizes that audiences respond actively rather than passively to mass-mediated culture and that different national, ethnic, and racial groups interpret the same materials differently. Some globalization theorists have warned that the dissemination of global cultures will eradicate differences among national cultures while others have predicted that differences among national cultures will remain as people in different countries react differently to global cultures and each national culture becomes a hybrid of global and local cultures.

Clothes like other goods are believed to be "culturally marked"; they are representations of ideologies and styles of life that circulate in the countries where they originate. A study of responses to luxury goods by consumers in 12 countries found a strong association between nationality and attitudes toward these products [12]. However, recently, we have seen the emergence of a kind of transnational clothing culture in which certain types of items that are widely worn cease to refer to particular identities, either social or territorial. Specific items such as sweat shirts or jeans do not distinguish a Frenchman from an American or from an Englishman. Lacking value as emblems of a specific culture, they are nevertheless universally desirable. Companies like Nike and Benetton sell their products in over one hundred countries which suggests that tastes for these types of goods are remarkably similar.

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11 See, for example, Appadurai 1990.

12 Dubois & Laurent 1996.

Some information is available about how people in different countries have responded to images in global advertisements for clothing companies. Responses to Benetton's highly controversial images varied in different countries, depending on different social, cultural, and political contexts. Information about responses to advertisements with racial implications is available primarily for the United States. Nike has been accused of profiting from sales to African Americans derived from drug and gang money and of ignoring the problems of the poor, black communities where these consumers are located.

In spite of the enormous sales of their products, clothing and shoe companies with global markets have been faced with an international social movement that has attacked their use of cheap contractors in Third World countries paying low wages to manufacture their products. Because its successful advertising has made Nike exceptionally visible, protest groups have focused particularly on Nike's relationships with foreign contractors. Protest groups in several countries have attempted to raise public awareness of Nike's labor policies by organizing specific events.

National and international policies toward globalization in the fashion and clothing industries

A fourth approach to understanding globalization focuses on the *strategies* used by nations, global cities, and cultural organizations to cope with, counter, or facilitate cultural globalization. In developed countries, policies for the clothing industry have been mainly concerned with protecting national industries from foreign imports. These types of policies have existed for decades. Protectionist measures, such as quotas and tariffs, play an important role in the location of apparel production in global commodity chains [13].

In the past half century, there have also been major agreements among countries that provided for regulation of the clothing industry on the international level. These agreements have set quantitative restrictions on imports of clothing products which were highly discriminatory at the country and product level. Under the Agreement on Textiles and Clothing negotiated in connection with the Uruguay Round of GATT in 1993, elimination of these quotas will occur by 2005, although it is believed that textile and clothing protection will be maintained in a variety of other ways [14]. It is significant that the developing countries which will benefit most from the new regulations are countries where labor costs are lowest.

In the developed countries, national governments have not responded in a meaningful way to extensive protests against the practices of multinational clothing and shoe firms [15]. In these countries, any meaningful change in conditions surrounding the manufacture of clothing is likely to occur as a result of interventions by IGOS and INGOs.

In spite of considerable controversy in some cases, little attempt has been made to control the characteristics of advertising used by apparel and shoe companies. Countries vary considerably in their levels of resistance to global advertising images. National traditions and public attitudes affect the ways in which advertising images are interpreted. National regulation of this type of advertising is possible, even if it rarely occurs.

Conclusion

What can one conclude about the relevance of these four models for understanding fashion and clothing as a form of globally disseminated cultures? Images disseminated in fashion and clothing advertising have social and political implications, that represent a contemporary form of cultural imperialism. Like other forms of global culture, the dissemination of fashion and clothing is dominated by and in the future will increasingly be dominated by conglomerates and multinational firms based in the West, and thus corresponds to a center-periphery configuration.

The second model, the cultural flows or network model, predicts a larger role for regional cultures,

13 Gereffi 1994, p. 101.
14 Reinert, 2000, p. 41.
15 Klein 2001, p. 410.

particularly Third World countries. Unfortunately, the enormous influence of multinational fashion and clothing firms restricts the role of Third World countries largely to the manufacture of products designed in the West. However, the luxury fashion industry fits the network model in some respects. A small number of advanced countries exchange luxury products, particularly fashionable clothing. In the future, the network model should be increasingly relevant to the study of cultural globalization as more regions and more countries produce more culture and send it to other countries.

Attitudes toward luxury goods have been shown to vary considerably by country. Attitudes toward fashion-oriented clothing vary depending upon whether the clothing is perceived as a local product, a foreign import, or a transnational product that has lost its identification with a specific country. Resistance toward the international dissemination of clothing products has been expressed through an international social movement against sweatshops.

Finally, government strategies for controlling and responding to the impacts of globally disseminated culture have been used more successfully by developed than developing countries. A major strategy among the developed countries has been that of restricting clothing imports from Third World countries that are not produced under contract with Western firms. Western countries, particularly the United States, have attempted to control global markets and to diminish competition for their products.

To conclude, each of these four models is useful for explaining specific aspects of the global dissemination of fashion and clothing. Since cultural globalization is not static but an ongoing process whose dimensions are continually evolving and changing and whose consequences are difficult to predict, we can expect that these models will continue to evolve and hopefully that new models will emerge.

Diana Crane
Diana Crane is Professor Emerita of Sociology at the University of Pennsylvania. She is the author of several books, including Fashion and Its Social Agendas: Class, Gender and Identity in Clothing (2000) and co-editor of Global Culture: Media, Arts, Policy and Globalization (2002). Her e-mail address is: craneher@sas.upenn.edu.

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‘Primo’ Prototype – The New Human Body Design

(human – transhuman – posthuman)

Introduction

Engineering the new human will occur, but not in one fell swoop. The new human design, “Primo”, will occur sequentially by replacing the human body bit by bit with generated parts. Despite the fact that Primo is a huge undertaking, the sequential process is already taking place. From electronic prosthetics and cochlear implants to neurological pharmaceuticals, we are realizing the full potential of the human form, its skeletal system and the brain, with innovative technologies that will reduce the vulnerability of our body and mental processes.

If we consider the possibility that every human is disabled in some way, the gap between disabled and healthy is narrowed. While one person may have a physical disability such as deafness, blindness, and immobility, another person may mental or emotion disabilities such as memory loss, intellectual shortcomings, or phobias. Even being overweight is considered a handicap. Disease has no favorites and eventually every human will succumb to one of its maladies. Overcoming human diseases, as many and as varied as they are, enables all humanity.

In this paper I will address the new human as a specific genre in the editing and redaction of the human body. Who will design the new human body, and what social issues will affect the design process? What is natural and how far is too far when augmenting our bodies with smart technologies? Will there be major ideological shifts accumulating into an elite social class? To answer these and other questions, I will use the prototype “Primo” to describe the evolving science and the tools available in extending human lifespan, as illustrated in Figure 1.

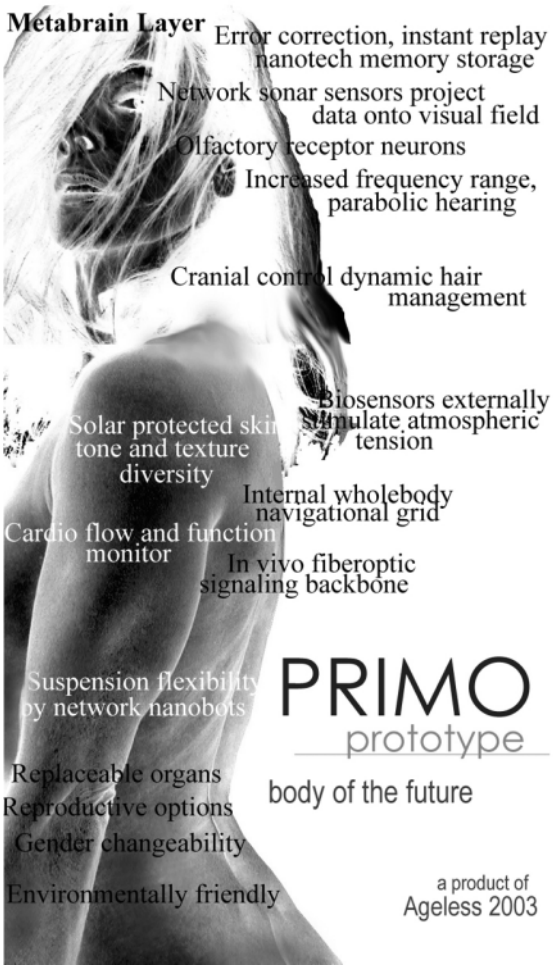

Figure 1.

Editing and redaction of the human Body

Editing and redaction of the human body has been occurring since early times. In 600 BC nasal reconstruction was designed by using a forehead flap over a nasal defect. [1] Early product designs for augmenting hearing were produced in the 1700s with speaking tubes and, many years later, digital signal processing occurred in 1984. The first heart transplant was designed by Dr. Christiaan Barnard in 1967, and 2001 the battery-powered implantable total artificial heart (TAH) came online. In the 1950s our brain's functions were modified by use of primitive clinical neurochemical modification and in the late 1992, anti-tremor electrode implants helped many people with neurological problems.

Prosthetic design goes back to the fifth Egyptian Dynasty (2750–2625 BC) when archaeologists unearthed the oldest known splint from that period. The earliest known reference to an artificial limb was made around 500 BC when Herodotus wrote of a prisoner who escaped from his chains by cutting off his foot, which he replaced with a wooden substitute. The oldest known artificial limb, dating from 300 BC, was a copper and wood leg unearthed at Capri, Italy in 1858. [2]

Considering the watershed of technological invention and biotechnological advances over the last century, it is no wonder that we are further upgrading the human body to meet our 21st Century needs. While both physically and mentally, we hope to be active and healthy without intervention. However, when necessary, we rely on smart design innovations of scientific and technological aids.

Who will be the Primo designers?

Designing the new human body is a multidisciplinary matter. The instinctive cross-pollination of ideas that occurs among disciplines fosters a conjectural, multidimensional process as a powerful tool for addressing complex issues. Herein, it is imperative to address the role of artists and designers in challenging conventional assumptions concerning how much to tamper with the body, what is natural and ethical, and how far is too far. Designers tend to look for solutions to problems and one of the most urgent problems in society today is overcoming physical and mental ailments.

The human body has been a design issue for eons. From da Vinci to Rodin, Botticelli to Picasso, artists have revered the human body as challenging.

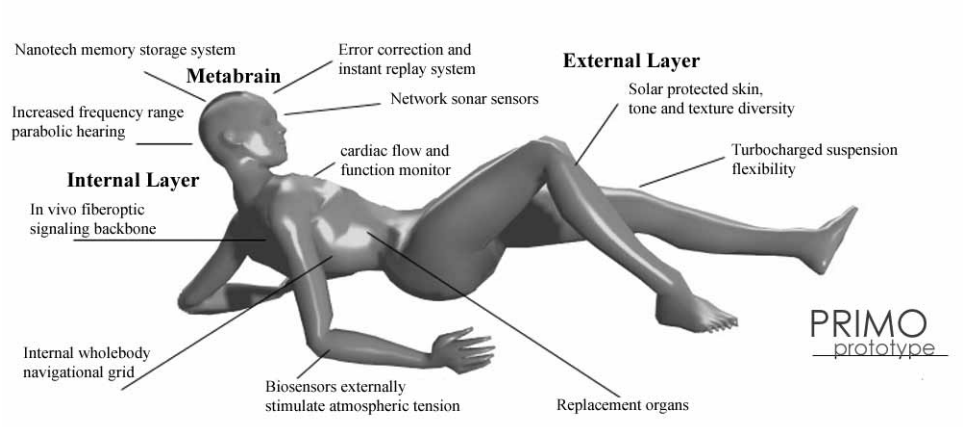

Figure 2.

[1] Samhita Sushruta, India.
[2] Bellis 1997.

Table 1. Primo Prototype Comparison Chart.

HUMAN BODY	21ST CENTURY PRIMO PROTOTYPE
Limited lifespan	Ageless
Legacy genes	Replaceable genes
Wears out	Upgrades
Random mistakes	Error correction
Sense of humanity	Enlighten transhumanity
Intelligence capacity 100 trillion synapses	Intelligence capacity 100 quadrillion synapses
Gender restricted	Gender changeability
Prone to environmental damage	Impervious to environmental damage
Corrosion by irritability and depression	Turbocharged optimism
Elimination of messy gaseous waste	Recycles and purifies waste

The fields of engineering, robotics, and biotechnology have also approached the human body as challenging. For example, the ARTS Lab (Advanced Robotics Technology and system Laboratory) of the Scuola Superiore Sant'Anna in Pisa has been purposely established with the aim of carrying out theoretical and experimental research in such interdisciplinary areas as robotics and bioengineering. This is an excellent example of futuristic design ideals being used for current social needs.

The aforementioned multidisciplinary methods combined with conceptual art, product design, industrial design, biological architecture, virtual design, and engineering, come into play. The designer's responsibility is to innovate new product ideas based on a proven marketability or through newly identified trends. If a product development area exists, the designer's role is mostly creative and relies heavily on liaison with counterpart customers and suppliers. However, designers must have a realistic understanding of cost structures in order for them to create products within the cost constraints. Prosthetics and robotics have pushed the costs of products down simply by supply and demand. As we approach a time when more and more people need to improve their physical and mental abilities, such as in Figure 2, the economics of "body product design" will come into play.

What should designers create?

The big question is what design issues should students and professionals tackle. Most schools are interested in the imaginative front end of design to answer the question "what should we create?" The Primo prototype addresses certain biological traits as design/engineering problems and solves them with conjectural solutions, as shown in Table 1. When viewing this chart, please note that although Primo is a conceptual design in part playful, it is also a tangible concept.

Social and Ideological conflicts

The fundamental design patterns for the full contour of the new body will become a resounding public issue, which may inhibit and restrict futuristic philosophical views and technical innovations. The public wants to be involved in the arts and will certainly want to be involved in the shape of their own future. Even today, the public viewing of such art forms as painting, sculpture, symphony or dance can affect the prosperity of the artist. Consider the effect on society when it is the artist designing the look of Primo! This new art medium, the human body, will not be the sole design problem or creative resolve of the artist. The new human body will be looked at as every person's design challenge.

The mounting public sentiment and rising conflicts of ethical views must be addressed by the artistic conceptualizes and designers of the new human body. The questions listed in Table 2 could be used to understand society's views on human augmentation.

The design community, comprised of fine artists with technological prowess and technicians with an aesthetic sensibility may face head-on collision with sub-cultures that foresee sweeping alterations to the human psychology. For example, extropian transhumanists who are known for encouraging improvement of the human condition and overcoming the disease of death may press designers to push further than what social standards can accept. We see instances of this happening today. Individuals such as actor Christopher Reeves pushing for the research and experimentation of stem cells to be used to repair nerve cell damage in the spinal column. Leon Kass, (head of President Bush's Bioethics Council), and religious fundamentalists opposing Reeves's ethical values based own their on moral standards. (Table 3)

While the most radical concept to propose to society is extending life and redesigning the human form, simply adding new gadgetry to our bodies will not make us modern or evolved. As we grow more chameleon-like and change our characteristics and the characteristics of our environments, we will still have to learn about life from our own experiences. The enhancing and augmenting of the body and the senses has been and will be the leading edge of collaborative innovations in both the arts and the sciences and will produce a definitive shift in culture. Although the ethical ramifications of viewing the human body as a design piece will affect social networks whose imprinting deems the human as perfect and hold human limitations as a given, by and large humans want to be healthy and enjoy life. [3]

But what about the speed and depth of change? Today we communicate in all sorts of pseudo-personality types through the Internet. In fact, it accepted to take on a different name, personal profile and even gender. As the Internet develops and altered reality [4] comes on line, we may experience what I call "mobile identity." "People have been building artificial symbolic "sur-realities" for quite a while now, though their artifacts (from art to music to fashions to traffic signs) have been mostly based on the physical features of the perceived objects. Shifting some of the imaging workload to the perception software may make communications more balanced, flexible, powerful and inexpensive.

"With time, a growing proportion of objects of interest to an intelligent observer will be entirely artificial, with no inherent "natural" appearance. Image modification techniques then may be incorporated into integrated object designs that would simultaneously interface with a multitude of alternative intelligent representation agents."

"The implementation of enhanced reality extensions would vary depending on the available technology. At the beginning, it could be a computer terminal, later a headset, then a brain implant. The implant can be internal in more than just the physical sense, as it can actually post- and re-process information supplied by biological sensors and other parts of the brain. The important thing here is not the relative functional position of the extension, but the fact of intentional redesign of perception mechanisms – a prelude to the era of comprehensive conscious self-engineering. The ultimate effects of these processes may appear quite confusing to humans, as emergence of things like personalized reality and fluid distributed identity [mobile identity] could undermine their fundamental biological and cultural assumptions regarding the world and the self. The resulting "identity" architectures will form the kernel of trans-human [culture]." [5]

What can designers do?

Imagine it is the year 2030 and we are looking back on our accomplishments of the past three decades. How should our time be best remembered? How

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[3] Vita-More 1997.

[4] Chislenko 1997.

[5] Ibid.

Table 2. QUIZ offered by NVM Projects.

HUMAN RIGHTS: ETHICS – SELF-RESPONSIBILITY – IDENTITY

People have a right to use biotechnological advances for reproduction, physical handicaps, and to improve their current condition both physically and mentally, even if the technology is not available or affordable for everyone.	Strongly Agree	Agree	Disagree	Strongly Disagree

Table 3. QUIZ offered by NVM Projects.

HUMAN RIGHTS: POLITICS – CONTROL – LAWS – REGULATIONS

A governing body should make all policy decisions about biotechnology, its research, development and use.	Strongly Agree	Agree	Disagree	Strongly Disagree

Table 4. QUIZ offered by NVM Projects.

SPEED AND DEPTH OF CHANGE

By the end of the 21st Century, the biological body will no longer exclusively define the boundaries of the human body.	Strongly Agree	Agree	Disagree	Strongly Disagree

about: Paralyzed child able to run thanks to body prosthetics!; Cancer Reduced to a Minor Health Problem and Easily Curable; Billions Communicate Through International Cultural Network; Nanotechnology solves Environmental Damage of Past Centuries; Zero Level Unemployment for Artists and Designers; World's Wealth Realized through Art; or, Garden donated to World's Last Hungry Person.

Each of the above "future headlines" is fun, but also raises issues implicating our basic values. The swift progress of technology and both the promise and peril it presents are serious concerns; the basic question of whether we will continue to progress or turn away in fear needs our earnest attention and ability to solve problems. Strong opposition and ethical concerns will cross over cultural lines from generation to generation passing on the baton of prejudice.

In summary, it is precipitous for artists to continually question the traditional. Inasmuch, the overriding social assumption is that human limitations are natural. In this regard, we see biotechnologies such as genetic engineering or stem cell therapies accepted and promoted by one segment of society, and opposed to as immoral by another segment of society. Tensions could affect the innovations of designers who are at the mercy of what can and will be marketable. Practical optimists and strategic futurists can promote positive public attitudes toward these vital advances by showing how progress can be both ethical and beneficial. The new human body design and its enormous advantages to humanity can surmount the major ideological issues that will inevitably occur.

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Designing Systemic Innovation for Sustainability

Abstract

The paper highlights some major issues for the design (research) related to the transition towards the sustainability. These issues are linked by the fact that it has always been a matter of system design, or better still a matter of "widening" the system to be designed.

It is firstly assumed that the Life Cycle Design (LCD) is a fairly consolidated, yet not diffused discipline. The "life cycle" and the "functional" thinking are the key leading concepts to introduce the environmental requirements within a product design process. In fact, competencies, methods and tools have been produced on a workable level for the design practice and education. The problem is that they are applied and taught in a fragmentary and scarce way world wide.

The second assumption is that LCD of a single (material) product is not enough to tackle coherently the transition towards sustainability, because this transition requires innovations characterised by "radicality". Given the above assumptions the design approach to sustainability needs to shift from product to "system design". Various authors agree that the Product-Service Systems (PSS) innovation strategies have the potential to leads towards system eco-efficiency, because of the stakeholders' convergence of interests towards system optimisation (in resource use and emissions). Within this framework, the designer competencies should move towards those of the "strategic design": the capability to create new configurations/relationships between stakeholders and develop an integrated system of products and services that is coherent with the medium-long term perspective of sustainability.

Considering the design competencies, it is finally proposed to consider the PSS concept as a promising approach even for the "equity improvement" dimension of sustainability. More precisely, the PSS applicability to developing and newly industrialised (emerging) contexts: the design of PSS innovation strategies as opportunities to facilitate the process of socio-economical development – by jumping over or by passing the stage characte-rised by individual consumption/ownership of mass produced goods – towards a more advanced "satisfaction-based" and dematerialised service-economy.

Life Cycle Design: a consolidated yet not diffused discipline

Life Cycle Design

In the second half of the 90s the discipline that faces in all its dimensions the design of low environmental products, began to be more clearly and exhaustively defined. It also began to be clear what we should mean by *Environmental Requirements of Industrial Products* and was introduced the concept of *Life Cycle Design*. The concept of function in design is ri-contestualised in the environmental dimension (the functional unit). What *Environmental Requirements of Industrial Products* means become clear after studies and new methods of assessing the environmental impact of the input and output between the technosphere and the geosphere and the biosphere. Among the others the most accepted is the *Life Cycle Assessment (LCA)*.

The leading concepts of Life Cycle Design are:

1) an extended design horizon (systemic): from product design to the design of the product life cycle stages;

2) a new design "reference": from product design to product "function" design. Within this framework the product has to be designed considering all the phases of the life cycle. All the activities needed to produce the materials and then the product, to distribute it, to use it and finally to dispose it, are considered as a single unit.

The second criterion of *Life Cycle Design* is to design beginning from the *function* [1] delivered by the product, more than from the physical product itself. In fact, it is in relation to this function (functional unit) that it is possible (with e.g. LCA) to assess whether the environmental impact has been reduced and how. The function, a fundamental theme in the historic culture and practice of design, acquires in this context a new meaning and a new vitality.

Consolidated yet not diffused

Nowadays the Life Cycle Design is a consolidated discipline. In fact, there is a clear theoretic framework, there are clear (environmental) requirements,

1 Manzini & Vezzoli 1998.

available criteria, methods and tools. On the other side (as for every emerging discipline) it is not yet diffused both in design practices and education. A survey conducted in the year 2001 of Italian including both individual design practices and design departments within companies highlighted a general lack of environmental competencies. The same survey conducted on Italian Universities highlighted that the *Life Cycle* and *functional thinking* approach is not yet the diffused the "smallest common factor" of all educational curricula, even thought a clear improvement in the last ten years in this field.

Projects for LCD diffusion in higher education in Italy

The Research Unit Design in Innovation for environmental Sustainability (DIS) of the INDACO dept. of the Politecnico di Milano University, has addressed the above issues, by developing a set of interrelated projects and products[2] for education on sustainable product and services design[3], to facilitate knowledge and competency for the development of sustainable products and services, both within Italian university higher education courses and in vocational training[4]. The projects and products are briefly described below.

Rapi.rete

Rapi.rete is a network of educational centres (named Laboratories), which are jointly co-ordinated and operate as service centres for university and vocational students on sustainable product and services development. The brief of the *Rapi.rete* network is the consolidation and dissemination of the academic discipline of *Environmental Requirements of Industrial Products* (Life Cycle Design) at a national level within different universities and other educational centres. The network performs a range of activities and has a web site (<www.polimi.it/rapirete>) containing information on: Courses; Teachers; Theoretical programmes; Students results. Furthermore the web provides access to:

1) Audio/video distance education modules;
2) Educational support tool;
3) Forum for discussion;
4) Other pertinent information is made accessible.

Eco.Cathedra

Eco.Cathedra is a software support tool for teachers to enable them to more easily explain environmentally friendly design strategies and sub-strategies and link them to images of low environmental impact product and services. It is a hypertext software package with an upgradable database from which it is possible to create and customise a digital lecture. The *Eco.Cathedra* database is divided in two sections:

1) "Products" with a high environmental quality: images and information describe the general characteristics of the products and their environmental qualities;
2) Environmentally friendly "Strategies": these are hierarchically organised (from general to more specific) and linked to specific products as examples.

Eco.Cathedra has three main functions:

1) *Visualise*: students and teachers can consult the "Products" section by selecting from a range of; alternatively they can consult the "Strategies" section which is then clearly illustrated by product examples;
2) *Upgrade*: a default database is provided, but is possible to upgrade (even completely), both the "Strategy" (changing the text, and the hierarchical structure) and the "Product" section (adding and eliminating products or their text and images, and adding and eliminating links with strategies);
3) *Create a lecture*: teachers can create specific slide shows (in a digital format) as a support for their (*on campus*) lectures. Every slide show is created starting from the database (either the default or the personalised) but can be aggregated and disaggregated in variety of ways. Lectures can be created as: a) a hypertext structure of hierarchically organised strategies linked to product images or; b) a simple sequences of product images. The format of any presentation can also be customised (background colour, headings, etc.).

It is important to note that this tool has been developed as a platform to be shared by the various educational centres in Italy, for an easy exchange.

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2 These projects and products are financed by the Italian Environmental Protection Agency (ANPA, now APAT).

3 These projects are co-ordinated by the author of the paper.

4 Vezzoli 2002.

Eco.Officina

Eco.Officina is a software tool for students (led by the teacher) to create learning exercises i.e. evaluating the environmental impact (LCA) on the one hand and, on the other hand, managing the ideation (creative generation) of sustainable concepts (ICS method [5]) on a multi-criteria and multi-layer series of interactive screens. There are three main working areas:

1) *Data insertion*: This is based on a system of modules which allows a participant to insert all relevant processes which characterise the product life cycle;

2) *Assessment* (Life Cycle Assessment): This is based on a system of dynamic tabs and graphs which report the results of the various phases of an LCA;

3) *Sustainable Concept Ideation* (ICS): This is based on a system which is able to flexibly manage the ideation of sustainable concepts (e.g. a brainstorming support); it is also able to prioritise strategies (using weighted criteria) and thus provide environmental assessments of concepts (ICS method).

Eco.Disco

Eco.Disco is a multimedia software tool for self paced learning and distance education focussing on the issue of sustainability, Life Cycle Design and methods of environmental assessment. It contains comprehensive self-evaluation segments. More specifically there are two main sections:

1) *Self-paced learning pathways*: This is composed of a series of multimedia modules (voice, moving images, schemes and texts) organised on four levels;

2) *Self-evaluating modules*: open and closed questions enable students to review different sections of content.

Sustainability asks for system innovation

Taking seriously the term sustainability, in the last decade, we started to acknowledge that the entire production and consumption system will require a radical reorientation. Recently, it has become clear that such interventions must be more *radical* and go beyond the re-designing of existing products in order to catalyse a transition towards a sustainable society [6].

Aiming at radical sustainability improvements, higher level of innovation is required. And for higher level of innovation we have to move from product innovation to wider system innovation.

From "functional" to "satisfactional" unit

To help achieving a wider system innovation, the conceptualisation design process has to move from a *product function-based* approach (typical of the Life Cycle Design) to a *satisfaction-based* approach. The term *satisfaction* is used to emphasise the enlargement of the design scope form a single product to the system of products and services that together fulfil a given demand of needs and wants (satisfaction). In other terms shifting from product design to what begin to be called *Product-Service System (PSS) design*.

Product-Service System innovation

"A Product-Service System (PSS) can be defined as the result of an innovation strategy, shifting the business focus from designing and selling physical products only, to selling a system of products and services which are jointly capable of fulfilling specific client demands [7]."

A so defined PSS introduces a new interpretation of the concept of *product*, moving from the product as the physical result of an industrial process of production, to a new meaning in which the *product* of a company (or an alliance of companies) is an integrated whole of mutually dependent products and services, that focus on meeting some specific customer demand (of *satisfaction*).

On the customer side, the underlying assumption (in this change in the company-client relationship) is that users are not really wanting a product or service per se, but rather what these products and services enable a user to achieve: the *satisfaction*.

On the provider's side PSS requires the development of new relationships and forms of partnership among the stakeholders of a value production chain. In other words, new interactions are mandated with the

5 ICS (Ideation of Sustainable Concept) is a method developed by the author of this paper.

6 It is generally believed that we need to move to a point where we are reliant on 10% of the resources that the industrialised societies are using today.

7 Vezzoli & Manzini 2002.

client, and innovative partnerships are needed with other producer/suppliers, public bodies or not for profit organisations. Thus with this approach, the producers or the service providers, extend their interests beyond their usual boundaries, in terms of both product life cycle phases (pre-production, production, distribution, use and end-of-life) and connections with other products and services, which, taken together, will result in an integrated solution for the customer *satisfaction*.

Opportunities for sustainable solution

For many authors [8] a key interest of PSS are the potentialities that this approach presents by producing synergies among profit, competitiveness and environmental benefits. It is generally agreed as well, that PSS, as a conscious business strategy, does not lead necessarily to sustainable solutions. In fact, some PSS changes could even generate unwanted side effects, usually referred as *rebound effects*. When a PSS assists re-orient current unsustainable trends in production and in consumption practices it is usually referred to as a Sustainable or Eco-efficient Product-Service System.

In a traditional industrially developed market the range of stakeholders (the raw materials and energy suppliers, the producers, the retailers, the consumers/customers and the end-of-life managers), who takes part in the whole process connected to product and service selling, tend to optimise their own "segment" of the process, i.e. their phase of the cycle (see the inner arrows of the figure). Typical stakeholders will operate as discrete entities. In other terms, in the industrially developed traditional model there is no necessary coincidence between economic value for individual stakeholders and overall systemic resource optimisation.

In contrast, the PSS approach, which takes as its starting point the goal of achieving an integrated solution to meet client demands, moves away from

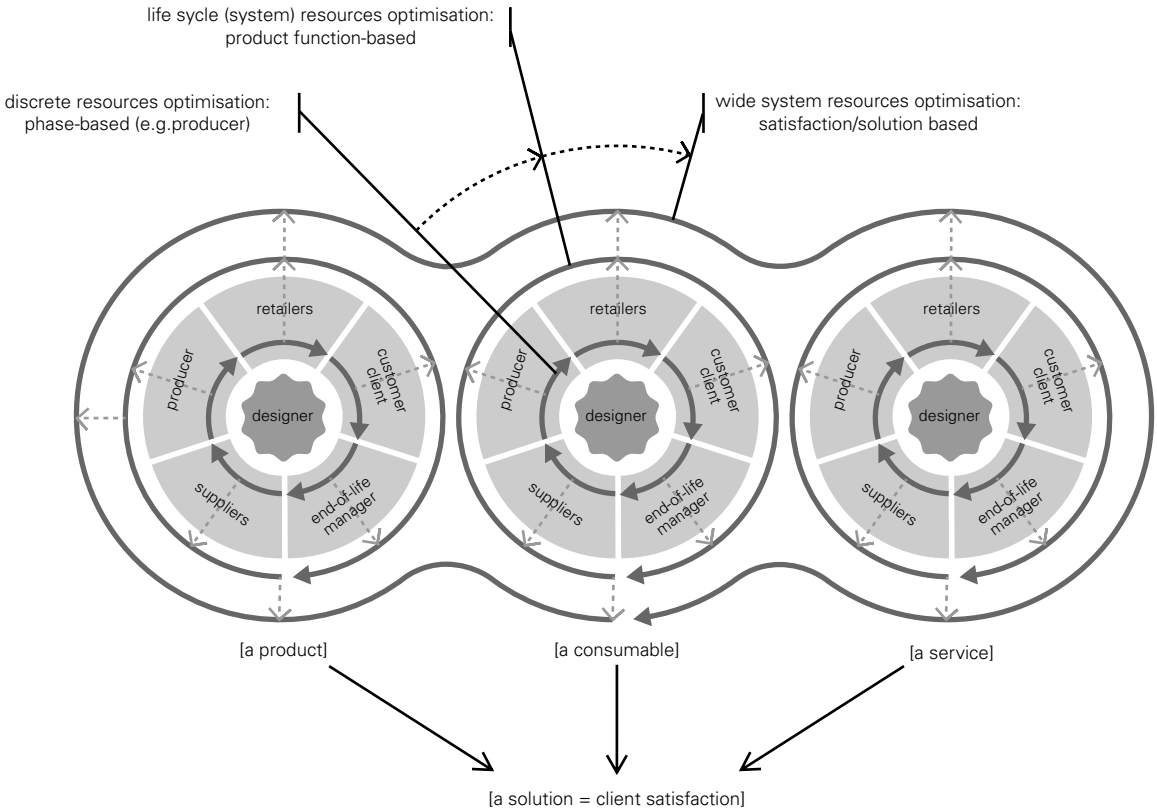

Figure 1. Stakeholders in PSS life-cycle mix: discrete → life cycle → satisfaction-system optimisation [9].

[8] Vezzoli & Manzini 2002; Stahel 2001; Goedkoop, Halen, Riere & Rommes 1999.

[9] Vezzoli & Manzini 2002.

phase based servicing and discrete resource optimisation, to system resource optimisation which is *satisfaction* based (Figure 1).

This could happen on two levels. We can draw a shift from *discrete phase-based optimisation* (from the inner arrows of the figure), to *product life cycle function-based optimisation* (to the intermediate arrows of the figure), and to *satisfaction/solution wide-system based optimisation* (to the outer arrow of the figure). The resulting PSS can produce synergies in profit, competitiveness and environmental benefits, because of the opportunities which arise from *broadening the system to be optimised*. In other words, the *potential eco-efficiency of a PSS relies on system optimisation (in resource use and emissions) because of the stakeholders' convergence of interests*.

So forth, the adoption of a PSS business model it is interesting because it implies new types of stakeholder relationships and/or partnerships, new convergence of economic interests, and a concomitant systemic resources optimisation. When the *full system uses fewer resources, it has a lower overall cost and the gains can be, in different ways, shared among the various stakeholders*. In general terms, the more the notion of whole system optimisation is broadened (beyond a single product life cycle to an interconnected series of product and service life cycles), the more the potential for eco-efficiency gains are greater. The stakeholders panorama is more complex, but offers greater potential for eco-efficiency system innovations.

The design of Sustainable PSS

Adopting the framework introduced in the former chapter to describe Eco-Efficient Product-Service System, the innovation has to be seen as a short-term *strategic* process which have resulted in new forms of organisation – companies as flexible networks, new relationships between producers and users – and innovative forms of co-production of value. In other terms, the uniqueness of their innovation does not lie in the area of technology (process or product), but in the way these more or less existing technologies can be systemised. A systemisation, which relies upon the different stakeholders involved in the value production system, in the innovative partnerships among producer/suppliers, public bodies or volunteer association and finally the customers, whether other businesses or final consumers. Hence, introducing PSS is the fruit of a "strategic design" activity. Various authors define this as the [10] capability of promoting new forms of organisation (the reconfiguration of the different actors roles), based on new systems of values (the emerging idea of well-being based on new criteria of quality) and able to create new market opportunities and develop an integrated system of products, services and communications being – at the same time – economically feasible and socially appreciable today. In our context the new criteria of quality and the new market opportunities are those coherent with the medium-long term perspective of sustainability. By this we mean a design capability of:

a) promoting new forms of partnership/organisation (new actors roles), aiming at strategic convergence, based on new sustainable satisfaction-based criteria of value;

b) designing a integrated systems of products and services dematerialised on a multiple life cycle scale.

In synthesis we could say that designing a sustainable PSS means to move from product Life Cycle Design to a strategic design approach to sustainability: a *strategic design for sustainability*.

Sustainable PSS design: a discipline to be consolidated

In a previous chapter we argued that LCD is a consolidated (yet not diffused) discipline. This is not the case for Sustainable PSS design. Further research in design is needed for:

a) a better understanding of PSS sustainability design potentials/limits (the designer competencies);

b) methods and tools for PSS sustainable design (and assessment).

Given the above assumptions, it is argued that the research could effectively define and consolidate those design competencies by merging those of the strategic design with those of LCD. This could be intended in terms of *sustainable orienting methods and tools (guidelines)* taken form those of the LCD

[10] Manzini 1999.

and adapted to the specificity of a *strategic PSS design process*.

Some interdisciplinary groups of researchers are working on it and some tangible results are waited for the coming years. Among others, the EU research, *MEPSS (Methodology for Product-Service System. A toolkit for industry)* aims at developing methods and tools for developing PSS. There are three main methodology areas: Assessment, Success & Failure and Design [11]. As far as design is concerned this will result in an action oriented manual for designer as a modular approach to design Sustainable PSS in three steps *scenario*, *service idea* and *service design*, with *orienting sustainable guidelines* for each of the steps [12].

PSS: sustainable opportunities for all?

What has been said in the previous chapters about the sustainable opportunities of PSS, has been as far researched and studied in industrialised countries only. In fact, developing countries (or better still *context* [13]) need to go through a process of economic growth to reach a standard of living similar (or sharable) to that of developed ones. As a consequence, we have to expect an increase in natural resources demand.

So forth an important questions is: *Can PSS, as an approach, be applied to reach more sustainable production and consumption patterns in developing and newly industrialised contexts?*

In other terms, could PSS be a valid business strategy for both developed and developing contexts.

Finally, what lessons can we draw from the applications and experiences of PSS in different economic situations? [14]

A reasonable objection to the above questions could be: why promoting sustainable PSS for the developing countries, as we know the 20% of the world developed population consumes 80% of the global resources? Would it not be more sensible to move those developed economies towards dematerialization?

This is indeed agreeable, but the transition towards sustainability should anyhow and always consider complementary paths in a complex and multilateral learning process. And the underlying hypothesis of this paper is that this could be one worthy of being explored.

At a first glance an answer to the former question is: PSS already exist in those contexts [15]!

We see more shared use of products (in keeping with cultural norms) than in industrialised contexts. For example the use of *car pooling* is a common solutions for mobility. Which is a sharing solution, hence in a mere environmental perspective better than using a single car per person.

In fact, is the lack of money for buying transportation vehicles, that leads to those solutions; there are no alternatives and the security conditions are generally very poor and the vehicles are far more polluting, compared with the industrialised contexts standards.

More generally, we could say that for developing countries many PSS already exist as a consequence of

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11 The partners of the design area are Politecnico di Milano, Econcept, Dalt and Domus; the author of the paper is the co-ordinator of the area.

12 Sangiorgi & Pacenti 2002; Vezzoli & Tishner 2002; Manzini & Trancois 2002.

13 It used in this paper the term "context" instead of countries, to remind that developed countries have underdeveloped contexts and voiceovers.

14 To give an answer to this questions the United Nation Environmental Programme (UNEP) has recently commissioned a research to the DIS Research Unit (Politecnico di Milano) that has involved various authors from developing and newly industrialised countries: Soumitri Varadarajan – Industrial Design Centre, Indian Institute of Technology, New Dehli, India; Uday A. Athavankar – Industrial Design Centre, Indian Institute of Technology, Bombay, India; Zhao Jianghong – Hunan University, Changsha, China; Benny Leong – The Hong Kong Polytechnic University, Hong Kong; Cleophas L. Migiro – Cleaner Production Centre, University of Dar es Salaam, Tanzania; Dijon de Moraes – University of Minas Gerais State, Belo Horizonte, Brasil; Andrèa Franco Pereira – University of Minas Gerais State, Belo Horizonte, Brasil.

15 And this was a first evidence raised from a some workshop organised by UNEP within the above mentioned project.

economic and cultural conditions, such as scarcity of access to products and resources. So forth, evidently, we can't say this kind of PSS is sustainable, at least in the social and ethical dimension of the sustainability.

On the other side, some of the most modern utilities have been offered and accessed by large numbers of people through service brokers. For example, the dissemination of Internet cafe sites (a PSS appreciable by both developing and developed contexts, so forth offering a globally "sharable" quality standard) in emerging contexts is even more rapid than in the developed world.

Finally, a "stronger" answer should be given to PSS sustainable applicability potentialities to emerging contexts. The hypothesis could be formulated in the following way: PSS may act as business opportunities to facilitate the process of socio-economical development – by jumping over or by passing the stage characterised by individual consumption/ownership of mass produced goods – towards the more advanced "satisfaction-based" and "dematerialised" service-economy [16].

Why not, from the beginning, the emerging context shouldn't de-link their economic growth from an increase in resource use? Using the words of Sachs, Khosla, and others [17]: why not "shrug off copycat development"? Why follow the obsolete path of development of industrially matured countries? Why make the same mistakes?

Sachs, Khosla, dare to say something even stronger (and more positive): why not "transform underdevelopment into a blessing [18]"?

Why not, if anyhow is lacking the inertia of consolidated and heavy industrial and economical systems (peculiar of developed contexts)?

This is not to say that applying Sustainable PSS in emerging context is a simple issue. It is indeed a very complex matter. And obviously the ways of sustainable PSS introduction would be different, because the starting points are diverse.

In a sustainable framework what should be "similar", even thought still to be defined, is the point of arrival: respecting socio-cultural diversities, a framework of a globally "sharable standard of well being" based on "dematerialised satisfaction" instead of on "resources-intensive system". A context coupling environmental and social sustainability. This is a very complex issue indeed, which is not the aim of this paper to discuss. In fact, this has to be understood and researched on a multilateral learning process. More modestly, this paper, assuming this as a background hypothesis, tries to open a discussion for the design research field, starting from what is known about PSS potentialities.

Sustainable PSS in emerging contexts

Here below we try to outline some evidences, to be studied, of PSS applicability to emerging contexts. As we argued in a previous chapter, the PSS are more eco-efficient on a system level because of the stakeholders' convergence of interests. That means, in the case of a system to be implemented from the beginning (as is the case of developing context), a PSS solution is in principle "cheaper" on a macroeconomic scale. In fact, a PSS as a whole and for a given demand requires less resources. In other terms, an economic implementation and expansion in poorer contexts of such systems (for the demand satisfaction), could be easier than other resources-intensive solutions.

Furthermore, PSS do not require significant investments in specific technologies, except for ICTs, which generally speaking require a drastically lower investment cost, in comparison with earlier economic infrastructures to be transferred to emerging contexts.

Besides, PSS are generally more labour and/or intellectual intensive activities, because services are generally so. And the lower labour costs may lead developing contexts up to an advantage. Hence their PSS could be more competitive.

A PSS approach typically focuses more on specifying the context of use, because it is characterised by a stronger and longer relationship with the customer. That leads to a greater company involvement at the

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16 Vezzoli & Manzini 2002.
17 Sachs et al. 2002.
18 Vezzoli & Manzini 2002.

user locations, which means a greater involvement of local rather than global stakeholders. In developing contexts this may have the positive implication of fostering the growth and/or empowerment of local depressed economies.

Finally, as we said, PSS focuses on "satisfaction" as a value instead of private ownership of physical products (the traditional perceived standard of well being in industrialised contexts). This may turn to be again an advantage, being the non-owning of products, closer to existing cultural-economical habits of those contexts [19]. In fact, what has been said is highly arguable and this opens, the real issue within this hypothesis.

The real issue

The real issue is to make PSS a business concept that developing and newly industrialised contexts may aspire to. Something that they may see as more interesting than the obsolete development pattern aiming at privately owned and mass distributed (physical) products.

In this perspective the issue for developing context now, is to examine ways of both improving the social and environmental quality of existing PSS and designing new PSS with a high system eco-efficiency and based on local human resources empowerment. To achieve this, it is essential the access to advanced and "light" information technologies and know-how, in order to have the potential to make these businesses really economically and socially appealing. Among others the access to interconnected systems, e.g. internet, etc.

It is as well essential the access to various competencies for high quality PSS development, implementation and monitoring; such as strategic, managerial, marketing and design competencies.

Finally (and obviously), ways of fair financing and credit should be accessible to local stakeholder.

A design research working hypothesis

The previous chapter has tried to pose the bases and justify the credibility of a novel working branch within the PSS research area: *the research of the PSS potentialities and characteristics to facilitate a sustainable transition of developing and newly industrialised contexts; together with those of the industrialised one in a bi-lateral learning process.*

As a consequence a multidisciplinary research branch could be initiated. That means a novel research area for design as well: *the research on the potential design role (competencies, methods, tools, etc.) in sustainable PSS development in developing and newly industrialised contexts.*

And this would ask for an interdisciplinary approach merging what is going to be consolidated in terms of eco-efficient PSS design (as discussed in a previous chapter) and the research disciplines linked with the socio-economical development of depressed contexts.

A back-casting process assuming (targeting) – in respect for the local diversities – a sustainable framework of a globally "sharable standard of well being" based on "dematerialised satisfaction" instead of on "resources-intensive system". The term "sharable" is used to frame the above hypothesis in the perspective of a globally connected world able to empower the "good" side of the local differences, while learning to "share" some common "standards of well being" (and not only the basic needs). Coupling in this way environmental and social sustainability. The above assumption is known to be crucial as well as very complex. And it is not the aim of this paper to analyse it. In fact, this contribution aims at opening a new design research field and a debate on it.

An that should be a feasible track for the *design research* to tackle even the social-ethical dimension of sustainability. In fact, the *research reasoning* is based on potentially practical design activities, with embedded sustainable values (to be studied), avoiding the risk of merely moralistic approaches. And this is, in the opinion of the author, the only effective way designers may tackle the social-ethical dimension of sustainability: to design new solutions (system for *demand satisfaction*) not only with

[19] This is very arguable because it may work for some NICs, but it may not work for some others.

sustainable qualities, but even better perceived than the existing ones. New solutions substituting the old unsustainable consumption (and production) systems, so forth, indirectly promoting new criteria of quality coherent with the transition towards sustainability.

An axample of a sustainable PSS designed for emerging contexts: the Greenstar [20]

Aiming at clarifying the above arguments it is here presented a real case of an advanced and sustainable PSS developed for emerging contexts. Evidently this is the result of a well consolidated design procedure, but rather a mostly unconscious strategic design of PSS for emerging context.

The Greenstar Solar E-commerce and Community Centre provides an enabling platform service, delivering a solar powered wireless connection to villages in the developing world, as e-commerce centres, so residents of remote rural communities can sell their wares worldwide: recorded traditional art, music, photography, legends and storytelling in small villages. Villagers own the Greenstar Village Centre themselves, and become shareholders in Greenstar. The centre is a unified hardware system, which is highly portable. It is all powered by a commercial-grade photo-voltaic solar power array, and connected to the web through a satellite dish or digital cellular modem for high-speed telecommunications. To date, pilot installations have been completed in a remote Bedouin settlement on the West Bank in the Middle East; in a small community in the Blue Mountains of Jamaica, and in the central India village of Parvatapur, and in a traditional Ashanti community in Ghana. Greenstar plans launches soon in Brazil and Tibet and in over 60 other communities on all continents of the world.

The facilities acting as e-commerce centres, generate income benefits for people who own and create the products. They also provide a return to Greenstar shareholders, in order to cover the cost of capital, provide marketing, logistics and distribution services, and to fund further Greenstar installations worldwide. Revenues earned from this "digital culture" are used to fund an ongoing, community-driven process of literacy, local business, education and training, public health, and environmental programs. This formula provides new jobs and skills, strengthens local culture and language, and affirms people's independence.

Some key questions

Trying to make a step further to structure this novel design research working hypothesis some (promising) questions are here posed as key issues to be answered by the design researchers:

– Could PSS favour and how in developing and newly industrialised contexts the conservative and regenerative use of local resources?

It has been observed [21], an in a way it is obvious, that when local stakeholder are involved in (local) resources extraction and selling they are more careful to preserve their re-newability. This is because their economy on a medium long run depend on them, so that they don't want to exploit them.

– Could PSS favour and how the establishment of economies based on non-fossil and decentralised energy resources/systems?

This is shown by the case of *Greenstar Solar E-commerce and Community Centre*. In that case the adoption of a particular PSS model facilitated the introduction of this solar powered and decentralised infrastructural innovation. Furthermore, this technologically advanced solution is probably the cheapest for the given context and aiming at the same type of results.

– Could PSS favour and how the generation of local economies and activities raising both employment and salary?

This could be given the PSS focus on specifying the context of production and use/fruition so forth increasing the power and involvement local stakeholder.

– Could PSS favour and how the improvement of the "intellectual intensity" in poor and illiterate communities?

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20 Vezzoli & Manzini 2002.

21 Sachs et al. 2002.

This could be given again by the PSS focus on specifying the context of production and use/fruition.

– *Could PSS favour and how the reduction of the "nature" market flow (flow of mineral and natural resources) from developing to developed contexts?*
This issue relate to the understanding of the PSS characteristics potentially leading towards such economical mechanisms extending the "local added value" besides the extraction of raw materials. Moving the income from the raw material selling to the artefacts (PSS) delivery, both for internal and for external markets.

– *Could PSS favour and how the access to global connectivity as a local empowering tool?*
This is shown by the case of *Greenstar Solar E-commerce and Community Centre*, where the introduction of a PSS model facilitated the connectivity to global opportunities.

Final remarks: design research facing sustinability

The paper has pointed a peculiar aspect of a design culture willing to face the sustainability: the need for a systemic approach. It could be said that, historically speaking (even thought a short history), for the design this has been and still is a matter of "widening" the system to be designed. These have been schematised in three steps (in fact very linked one to the other), with related areas of intervention for the *design research*.

First, the world-wide dissemination in education and practice of the Life Cycle Design (LCD) discipline which is consolidated, yet not diffused. In this framework, the networking among educational centres (locally and globally) is a key success factor in the overall improvement of the quality of teaching, as for every discipline (indeed the new ITC could be a formidable empowering tools for national and international networking activities). Anyhow, within this strategic framework, it is rather important to work on educational tools and to provide them in sharable ways. Tools with an embedded knowledge (e.g. LCA, LCD guidelines, etc.), that – if easily accessible (e.g. free of charge) and useful for the daily educational activity (e.g. to record information and to support the preparation of a lecture) – are a fundamental complement for the effectiveness of the networking activities.

Second, the need to shift from product to Product-Service Systems (PSS) design. This implying the consolidation of new designer competencies. And this could be effectively achieved trough the merging the *LCD* with the *strategic design* disciplines aiming at defining the capability to create new stakeholder configurations and develop an integrated system of products and services that is coherent with the medium-long term perspective of sustainability. This could be intended in terms of sustainable orienting methods and tools taken from those of the LCD and adapted to the *strategic PSS design* process. Something is expected to be available in the coming years as the result of various ongoing researches.

Third, the possibility to open the design competencies even to the "equity improvement" dimension of sustainability. The proposal here is to open a novel design research area: the design of sustainable PSS for developing and newly industrialised contexts aiming at the advanced "satisfaction-based" and dematerialised service-economy. From a research point of view the first issue is to further develop and better define the presented design research working hypothesis and to build-up an expert research community to work on it. In this case it would be needed to set up an expert network of (design) high education and research institutes, on "sustainable PSS design for all", to empower the learning process, the testing and disseminating [22]. A network where

[22] As an example is a design exercise being done by the students of the course "Design for Sustainability" carried out by the author of the paper, at the Faculty of Design of the Politecnico di Milano University. In this exercise the students are designing Sustainable PSS concepts for several University campuses located in different countries of emerging context. Professors from those campus provided information and made critics over the projects via internet. The Involved Universities are: Indian Institute of Technology, IIT, dept. Of Industrial design, New Delhi, India; Academy of Art and Design, Tsinghua University, China; Hong Kong Polytechnic, School fo Design, China; Universidad do Sao Paulo, Brazil; Istanbul Technical University, Dept. of Industrial Product Design, Turkey.

the universities/institutes could even be the "labs" for new sustainable ideas, and where the (design) curriculum could be the repository of advanced/ experimental education courses.

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Design Policy for Estonia in the Global Economy

Estonia is an economy in transition. For many, the Estonian economy began with the rebirth of an independent Estonia at the start of the 1990s. Leaving the centralized command economy of the Soviet bloc brought challenges as well as opportunities. Today, as Estonia prepares to join the European Union, the opportunities of larger markets and increasingly free trade are balanced by the demanding challenges of increasingly integrated participation in the global economy.

To meet these challenges, Estonia is now considering the development of a national design policy. This policy must be set against the background of a global knowledge economy.

Globalization is one of the most discussed but least understood forces in the world today. While globalization involves increasing competition and expanding business networks, it also involves the spread of democracy and the development of resources. A balanced view of globalization reveals both trends.[1]

One force that leads to globalization is the fact that economies and political units are larger than ever before. So are the networks of actors that operate within them. Another is the shift of economies from lightly worked natural goods to an increasingly complex range of manufactured goods and services.

The most visible aspect of today's global knowledge economy is the fact that the greatest value is added to products and services through human activity. For this reason, national competitive strategy generally involves finding ways to develop industries that add the greatest value to national economies. In a world where design represents an opportunity to add value to products and services at a relatively low marginal cost, governments are now considering design policies as a tool for creating competitive advantage. In this sense, design policies can become an instrument for economic growth in some ways similar to those aspects of other policies that affect economic growth, including policies affecting taxes, education, health, or immigration.

In 2002, the Estonian Ministry of Economic Affairs and Communications began to explore the issue of an Estonian design policy as part of the work leading to Estonia's membership in the European Union. With support funding from the Danish Ministry of Economic and Business Affairs, Estonia launched a research project to examine relevant national design policies and to study Estonia in relation to needs and policy proposals. An international research team led by Dr.Tech. Per Mollerup of Designlab in Denmark undertook the work. Team members were Prof. Ken Friedman of the Norwegian School of Management, Prof. Pekka Korvenmaa of the University of Art and Design Helsinki, and Mr. John Landerholm, an industrial designer in Denmark.

In July and August of 2002, the research group undertook a rough survey to identify possible design policy initiatives. The survey generated over three dozen leads.[2] From these, the group examined the policies of six nations.

In the next phase of research, the group conducted qualitative interviews to examine supply factors in the design profession and design education, and to examine demand factors in industry and business.

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1 Bauman 1998; Sassen 1998; Soros 2002; Stiglitz 2002.

2 Friedman 2002a; 2002b; 2002c.

This research was extended with questionnaires and other forms of inquiry.

In March 2003, the ministry presented the research findings to a group of experts for discussion and review. [3] This May, the ministry published the final report. [4]

The full project report is now available on the World Wide Web at URL: <http://www.mkm.ee/dokumendid/Disainiuuringu%20l6ppraport.pdf>

The report discusses the research project and the main findings, placing them in the context of national design policies elsewhere. This project suggests important opportunities for research in the area of design policy, and it locates design as an important economic factor in today's world markets.

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[3] Mollerup, Friedman, Korvenmaa and Landerholm 2003a.
[4] Mollerup, Friedman, Korvenmaa and Landerholm 2003b.

Synergy between Low and High Tech Solutions

It seems to be quite clear that there are certain limits for the consumption of energy and resources by human civilization. Typically man-made technologies have the crucial and often destroying role for other species and living structures on the Earth.

Definitely it would not be correct to criticize western people for their actions a hundreds years ago – the time when the intensive use of fossil energy sources started. Most clearly it was a step that simply could not be avoided. The extensive use of forest resources was hindered with that but at the same time the unlimited use of others, the fossil fuels, started.

The question is: "How can we increase the extent of common sense in our decisions and activities today?"

Historically the mankind has been caused the significant stress to the ecosystem quite often. The activities over the last century, driven by industrial reflexes and ambitions have apparently crossed the tolerance limit of the nature. The limit of the environmental fitness is exceeded because of the limitless industrial economy.

Today many nations do believe that the man made things have impact to the nature and that mankind must accept certain limits. Therefore we can meet many programs and conventions trying to reduce the use of energy and resources in industrial civilizations today. Such advantages and preconditions are leading technology development to the path of miniaturization.

Nanotechnology and sizing down to molecular level the different machinery – those are just some examples of the hopes and fundaments for less environmentally stressful society. And where is the best environment for embedding of such novel technical solutions? Surely clothing. In the other hand the question may arise: do we need to substitute everything with artificial prosthesis or amplifiers? The answer is – NO.

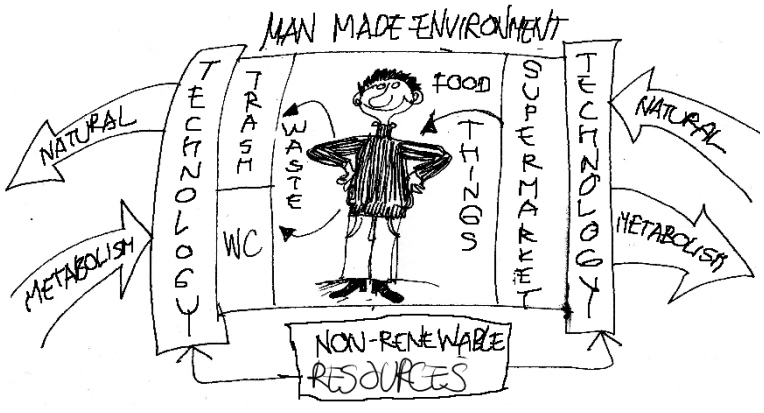


Figure 1.
People in modern western civilisations are mostly separated from rest of eco-system by technology barriers. Due to industrialisations those barriers become thicker and thicker. Industrialisation guided us to paradise and virtuality of "unlimited energy" of fossil fuels. Non-renewably powered barriers separating us from real processes we depending mostly on. Culture changed by such separation supports enhancement of unlimited growth based economy. Even more: ecologically understandable terms "reuse" and "recycling" are mentally smutty when source of things is shop and they will end in trash or toilet. Groundless is the common fear about the collapse of economy when non-renewable energy flux will be removed. Just new type technology is needed. With higher rate of environmental fitness.

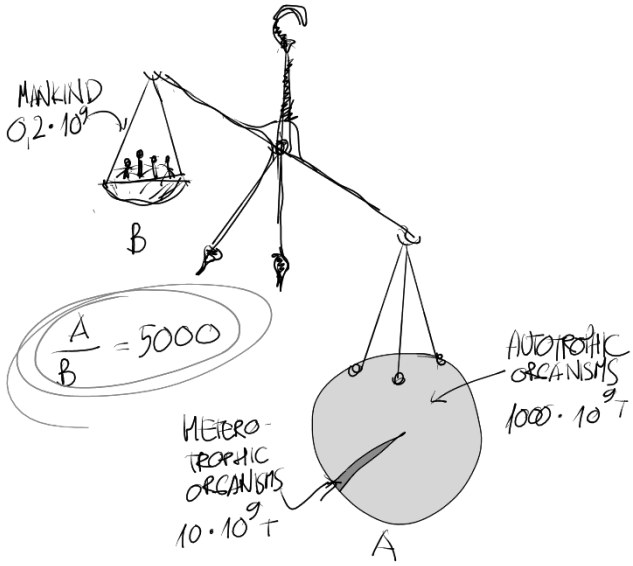


Figure 2.
Over the mankind dominates the biosphere because the total biomass of human beings is only 1/5000 from total estimated biomass of all living creatures on Earth. Diversity and huge number of connections besides the 1000 billion tons of biomass are the factors causing practical immortality of life on Earth. Mankind can be easily wiped out from Earth when all this huge ecosystem is disturbed too much. The licence to exist on Earth s given to mankind mostly by autotrophic organisms converting light and minerals to food and oxygen. There is no need for environmental protection: environment and biosphere protects himself and has been done this during last 3,5 billion years.

In economy we have the term "thin and invisible state" – remarking the need to minimize the state influence to the economy. In ecology we need to introduce the term "thin and invisible technology" to stress the need for the non-disturbing human behavior. Today's technologies have formed the thick barriers between the mankind from one side and the processes in the rest of biosphere from another. This separation causes the cultural and health disablements because it weakens the influence of the over 3,5 billion years old living system. Such attenuation damages our immune system.

It is environmentally less costly to control the closest space around the human body instead of controlling the entire city-space. Therefore the technologies of next generation most likely will appear in the form of virtual skin.

Some samples to illustrate the High Tech solutions of the next generation. In the cities for the street illumination from twenty to two hundred and fifty watts of electrical power per habitant is used. And still, often we are not satisfied and would like to have better illumination in the front of our houses or in some dark corner. Just imagine less energy-consuming substitute for this: sensitive computer-controlled camera with semi-transparent eye projectors (like eyeglasses). Energy consumption per habitant: few watts only.

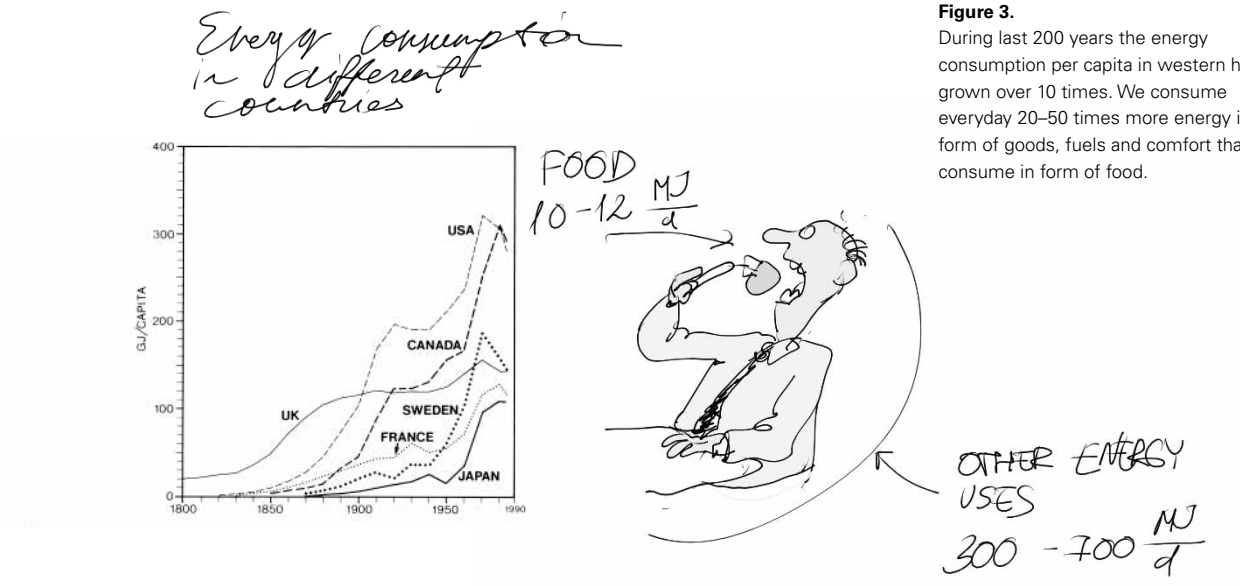


Figure 3.
During last 200 years the energy consumption per capita in western has grown over 10 times. We consume everyday 20–50 times more energy in form of goods, fuels and comfort than we consume in form of food.

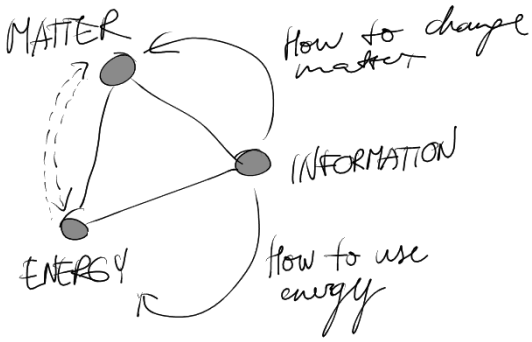


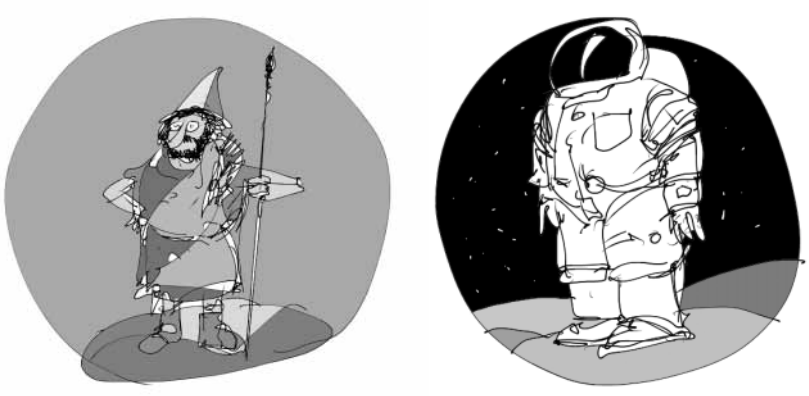
Figure 4.
All living creatures on Earth solving the problems in triangle of energy-information-matter. Using the information the energy is used to change the matter around. The existence of any living creature is determined by the quality of information as well as availability of energy Why we see today so big conflict between the natural ecosystems and political and economical systems created by Homo sapiens. The answer comes from journal "Adbusters": "The self-organizing principles of markets, that have emerged in human cultures over the past 10000 years are in conflict with the self-organizing principles of ecosystems that have evolved over the past 3,5 billion years."

For traveling in the cities people use daily two or three magnitudes more energy compared to that we consume in the form of food. In fact, we use this energy to move the movers (cars, planes, trains, ferries) instead of moving just ourselves. And, our body masses are only the fraction compared to the masses of mover's. The development of artificial muscles and actuators based on smart molecular structures could be one of the promising branches of the molecular technologies. The estimated energy consumption of such actuators approximately equals to the amount of daily food energy needs. Such an actuators can be designed for amplifying human muscle power and applied to reduce the travel time for short distances in the cities.

The intelligent clothing and textiles like the fur and animal skins allowed the humans already in pre-historical time to reach new activities and explore the environment. Therefore it might be logical to ask: "Where are and what are the modern caves or challenges for the persons with intelligent second skin?"

However, the simultaneous installation of high-tech solutions into the clothing as well as into the houses is not the best way for the reduction of non-renewable resources use. The wearable computing, communication and human capacity amplifiers and supporters embedded into the clothing – this is the technology future suiting well with simplified and ecological living environment.

Figure 5.
The clothing during the history has been smart all the times. Only the meaning of "smartness" has changed. Important mission today is not to overload this smartness with stack of non significant functionalities. The necessary functionalities should be supported by indispensable and adequate solutions: we do not need the space suit like clothing or spacecraft like buildings for everyday use on Earth because the ecosystem will support us enough. Even more: smart clothing means also the complexity of skills maintain and manipulate the eco-systems to minimise the high-technology needs in closest space around us.



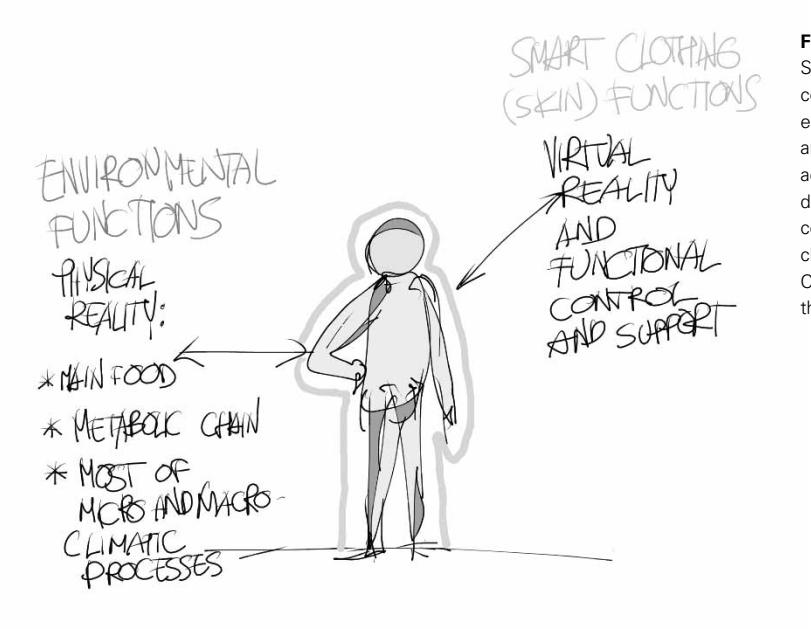


Figure 6.
Smart skin(clothing) is more then just stack of connected physical things. It is more like the entire concept how to join the environmental and ecological functions in larger scale with actual clothing equipped with different wearable devices. Smart fashion means the set of consistent trends and understandings. Smart clothing means the clear need for smart fashion. Consumer education and knowledge will became the part of fashion.

The principles of ecological construction and spatial planning are the low-tech solutions that will complete the personal high-tech skins. Only the synergy between the high-tech and low-tech solutions is the path to thin and invisible technology. We do not need to live in space station on ground while simply ecological solutions for food production; waste treatment, energy conversion and construction will provide enough healthy space. We need to study how to manipulate and arrange ecosystem instead of changing it. The smart reduction of the thickness of technology barrier has more crucial role than building up too sophisticated separations between the mankind and other living organisms and systems. Living machinery is perhaps too mechanistic term but please feel behind that the need for cleverer embedding of human beings into eco-system.

The increase of quality of food and living environment as well as health can be achieved only by increasing the low-tech solutions (like ecological building, farming) around us.

All species and their populations on the Earth are dealing with tasks in the triangle of information-energy-matter. The question is – how to use energy for the transformation of matter for different purposes. High technology and enhanced virtual reality in the form of smart skin could create more perfect common sense and more consistent information

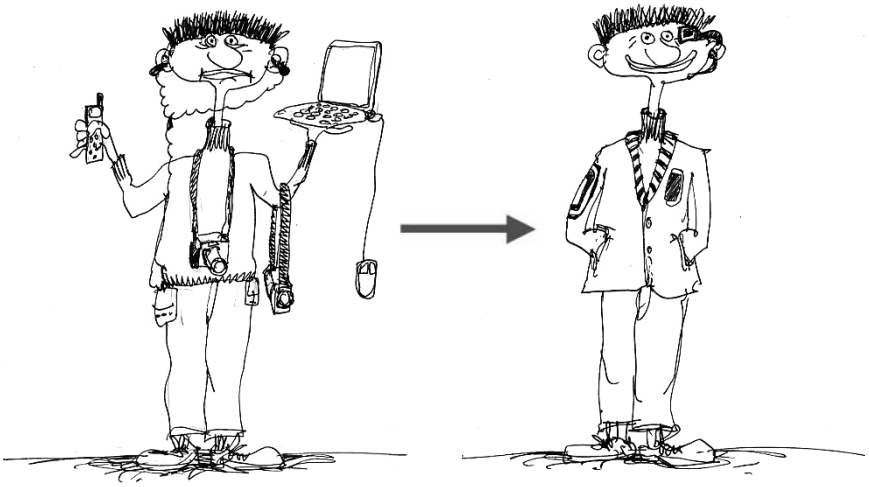


Figure 7.
Wearable devices means less attention to electronic equipment. In case of such integration is crucial the non-disturbing and transparent matter of such wearable interfaces. Today lot of technology users are forced to observe the long lasting technology "wake ups" and handshaking. Transparency will mean also the reduction of forced attention to technological functions.

Figure 8.
Ecological substitution of energy consuming solutions with integrated wearable solutions.

as well as coherent and adequate behavior. Low technology solutions would at the same time insure the physical environment fitting into natural metabolism chains and solar energy fluxes. That is the core of low and high-tech synergy: to be personally informed and protected and integrated with biosphere processes for taking sustainable solutions.

There is no clear answer to the question: "How are humans designed?" Naturalistic approach gives the answer: "By nature and evolution." Religious: "By God." Utopic desire about the cyber organisms: "By culture and technology." The truthful answer lies in the form of synergy between all those extremes.

There are 3 principles for synergetic and ecological smart skin (environment) design:

1. Support and amplify the functions. Do not substitute the organs and living functions in organism.
This is the principle of non-disturbing the immune system and other self-organizing structures in organism.

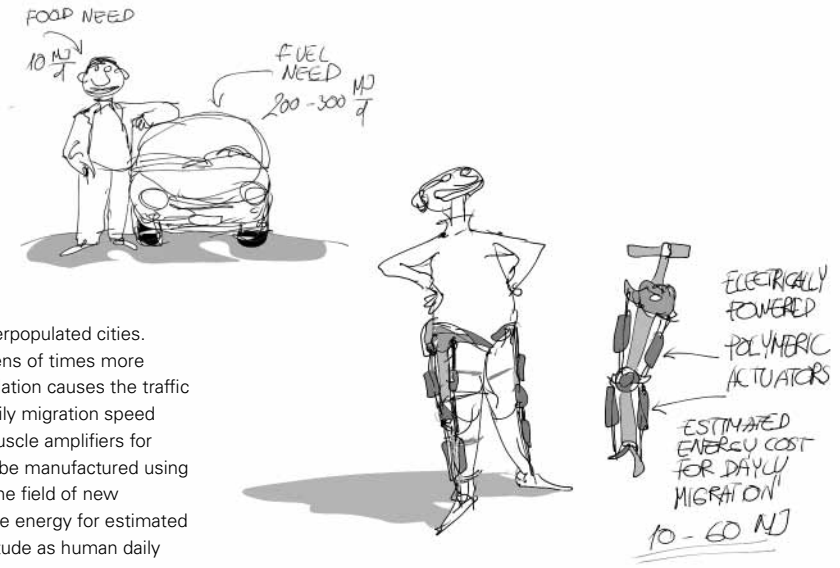


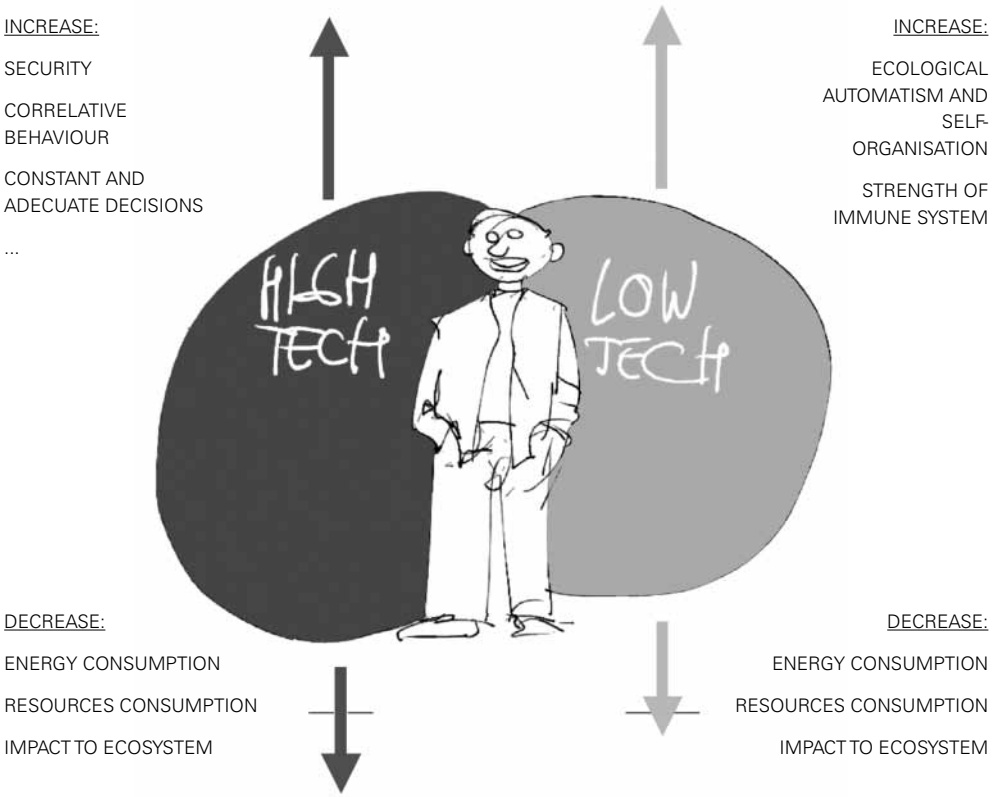
Figure 9.
Car is highly unefficient mover in the overpopulated cities. For daily moving car owner consumes tens of times more energy than driver food need. Overpopulation causes the traffic problems and significant reduction of daily migration speed and time spent for displacement. The muscle amplifiers for pedestrian functional enhancement can be manufactured using polymeric actuators technology. This is the field of new molecular smart materials consuming the energy for estimated everyday movement at the same magnitude as human daily food need.

2. Enhance the cognition space by integrating clothing with ergonomic information and communication systems. Create the transparent access from reality to virtual realities and vice versa.
This is principle of avoiding of over-virtualization.

3. Create healthy and ecological environment to reduce the emergence of functional and mental disablement.
This is the principle of correlation between the cultural/technological diversity and biodiversity.

Marek Strandberg
Estonian Fund For Nature, Chairman of the Board
Center For Ecological Engineering, Researcher
e-mail marek.strandberg@mail.ee

Figure 10.
About the meaning of high-tech and low-tech synergy.



The Design University

University-level design education involves two great responsibilities. The first is to structure an effective learning process to educate tomorrow's designers. The second is contributing to the knowledge the field through basic, applied, and clinical research.

Design is a broad field of making and planning disciplines. These include industrial design, graphic design, textile design, furniture design, information design, process design, product design, interface design, transportation design, systems design, urban design, design leadership and design management and well as architecture, engineering, information technology, and computer science.

These fields focus on different subjects and objects. They have distinct traditions, methods, and vocabularies used by distinct and often different professional groups. While the traditions dividing these groups are also distinct, common boundaries that sometimes form a border also serve as meeting points where common concerns build bridges. The ten challenges of university-level design education form one set of common concerns.

Three performance challenges, four substantive challenges, and three contextual challenges bind the design disciplines and professions together in a common field.

The three performance challenges are that the design professions:

1. Act on the physical world.
2. Address human needs.
3. Generate the built environment.

In the past, these common attributes were not sufficient to transcend the boundaries of tradition. Today, objective changes in the larger world cause scholars, practitioners, and students to converge on common challenges. These challenges require frameworks of theory and research to address contemporary problem areas and solve individual cases.

These problem areas involve four substantive challenges. These substantive challenges are:

1. Increasingly ambiguous boundaries between artifacts, structure, and process.
2. Increasingly large-scale social, economic, and industrial frames.
3. An increasingly complex environment of needs, requirements, and constraints.
4. Information content that often exceeds the value of physical substance.

They also involve three contextual challenges. These are:

1. A complex environment in which many projects or products cross the boundaries of several organizations, stakeholder, producer, and user groups.
2. Projects or products that must meet the expectations of many organizations, stakeholders, producers, and users.
3. Demands at every level of production, distribution, reception, and control.

These ten challenges require a qualitatively different approach to professional education than was the case in earlier times. Past environments were simpler. They made simpler demands. Individual experience and personal development were sufficient for depth and substance in professional practice. While experience and development are still necessary, they are no longer sufficient. Most of today's design challenges require analytic and synthetic planning skills that cannot be developed through practice alone. [1]

Professional design practice today involves advanced knowledge. This knowledge is not a higher level of professional practice. It is a qualitatively different form of professional practice. It is emerging in

response to the demands of the information society and the knowledge economy to which it gives rise.

Research is vital if we are to meet these challenges. Consequently, design research has become a central framework for inquiry in design over the past decade. This fact has been a primary aspect of the shifting focus in design education from independent art and design schools to universities.

The research culture of the university requires far different habits of mind and behavior than the culture of studio practice around which art and design schools are built. The changes from one kind of culture to another are difficult, and the transition can often take decades.

A university that could build a design school from the foundation up would have an unparalleled opportunity to shape a new kind of design education. The planning process – and the learning process – would involve valuable lessons. These lessons could be put to good use by other university-level design schools, including those with strong traditions of their own.

When one of the world's great universities plans a major, new design school, the planning process is interesting and important. In this case, it is the University of California.

In the fall of 2000, the University of California at Irvine established a committee to develop a proposal "to create a school of design to foster inquiry into the nature of design and the design process. Its objective would be to advance the techniques of design, to train students in the technical and aesthetic dimensions of design at both the undergraduate and professional levels, and to investigate the deep intellectual and cultural issues associated with design in a rapidly changing world."[2]

Chaired by Professor Richard Taylor of information and computer science, the authors of the report include professors Kristen Day and Sanjoy Mazumdar of urban and regional planning, Michael D'Zmura of cognitive sciences, Douglas Goheen of drama, Michael McCarthy of mechanical and aerospace engineering, Molly Schneider of design programs, and Alladi Venkatesh of management, as well as Michael Clark, professor of English and comparative literature and associate executive vice chancellor for academic planning.

The project has now taken three years from the initial commission, and the university has now begun the consultation process needed for a consensus on the immense investment required by a new school of design.[3]

As a high-level study on the needs and requirements of university-level design education, the proposal is a significant research document. It addresses five key dimensions of design education today: philosophical, intellectual, academic, professional, and economic.

The history of universities is long and distinguished. While modern universities began in the 8th century AD, the first institutions that resembled today's graduate schools and research centers date back to Athens in the 5th century BC. The schools and libraries of Alexandria came not long after. Professional schools go back even farther, and professional education now dates back nearly five thousand years. Despite their ancient lineage, these two kinds of education remained separate until just before the twentieth century. It was only at the end of the 19th century that professional schools began to find a home in the modern research university. One reason for this delay is the conflict between two sets of challenges inherent in the twp kinds of education professional and civic.

Building a professional school within a university involves four great challenges. These challenges are:

1. Creating new knowledge,
2. Preserving existing knowledge,
3. Training specialists, and
4. Educating citizens.

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1 Friedman 2000.

2 UC Irvine Ad Hoc Committee on Design 2000.

3 UC Irvine School of Design Committee 2002.

Professional schools tend to preserve existing knowledge for specialist training anchored within the practices of existing professions. In some ways, this also reflects the cultural ethos of the craft guilds, another form of specialization.

Universities exist to create new knowledge and to educate citizens.

There is an inevitable amount of overlap between thee two kinds of schools. Professional schools require new knowledge, and research universities must preserve old knowledge. Nevertheless, the cultures of these two educations differ in their customary approach to learning. Professional schools are anchored in tradition, and students are trained by working under the supervision of masters. Universities are anchored in the tradition of reasoned inquiry and skeptical debate.

These contrasting challenges involve an inherent tension that makes it difficult to develop a new professional school by starting on the foundation of an existing school or department. This, in fact, has been one of the continuing dilemmas in design education. Design education was never part of the university tradition nor was it part of the first professional schools. Instead, design education was rooted in the crafts guilds. This foundation still flavors design education and the professorial practice of design. [4]

The UCI design school proposal is philosophically important because it has been conceived as a purpose-built professional design school in the university context. The committee has addressed the issues and concerns of such a school and the proposal balances challenges and solutions in an intelligent and sophisticated way.

The philosophical importance of the choices and decisions reflected in the UCI model is simple. We live in a demanding world sometimes labeled as a knowledge economy. This world demands new forms of higher education. To meet the needs of professional practice today, professional education must be located within universities.

While there is wide agreement that we must develop new ways of learning and working, the traditions, customs, and practices of existing schools and disciplines make it difficult to bring new approaches into being. As a purpose-built school with a new faculty hired and brought together to realize a new vision, the UCI design school can become an important testing ground for education, for knowledge development, and for research. Solving the challenges that will face one school will yield important lessons to other schools and to other universities.

Because of this, the UCI design school promises to make an important philosophical contribution to education in the twenty-first century.

The intellectual challenges are equally important. The UCI proposal offers new models for design education that integrate teaching and research, learning and doing. Most design schools have been built on the foundation of existing programs. This means that they begin out of balance. Programs lodged in prior traditions lean too far in one direction or another to form the foundation of a new approach, and such schools start staffed by faculty partisans urging that every tradition be maintained. A new school will start with no such handicap. As a result, the UCI School of Design can make an intellectual contribution of a kind that has never before been seen in design education.

Because it is purpose-built, the UCI design school will be a model that challenges other design schools to rise to a new level. It will do so for many reasons. First, it will compete with other schools for the best faculty and the best students. Other schools will have to improve to remain attractive to their staff and students. Second, it will become a rich center of resources, supporting its competitors at the same time that it challenges them. Third, it will be an important center of teaching and learning for those who come to UCI to study or to teach.

Together with teaching and learning, research activities will make such a school the center of a new approach to professional design. This will establish its contribution to the profession. On a fundamental

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[4] Byrne & Sands 2002; Friedman 1997.

level, training designers to meet the needs of a growing economy is a vital professional contribution. On a higher level, the role this school can play as a resource center and model will make a powerful contribution, reaching beyond Irvine and beyond California to affect the larger global design profession.

The final contribution is economic. If California were an independent nation, it would rank as the world's fifth or sixth largest economy, just ahead of France or slightly behind, depending on the exchange rate. The school will offer important resources to the huge regional economy within which it is embedded, and this, too, should generate models for design schools around the world.

In 1940, the Australian economist Colin Clark identified three classes of economic sector: primary, secondary, and tertiary. The primary sector extracts wealth from nature. This includes agriculture, livestock, farming, hunting and trapping, fishing and forestry. Secondary industries transform extracted material through manufacturing, building, construction, mining, and power production. Tertiary industries are organized around services, including commerce and distribution, transport, public administration, personal and professional services. [5]

Daniel Bell rebuilt Clark's structure to describe what became known as the post-industrial society, refining Clark's concept of service industries into three distinct sectors, a tertiary sector including transportation and utilities, a quarternary sector including trading and finance, and a quinary sector including health, education, research, and recreation. [6]

The most visible aspect of today's global knowledge economy is the fact that the greatest value is added to products and services through human activity. For this reason, the competitive strategy of corporations – and of regions or nations – involves finding ways to develop industries that add the greatest value to national economies. In a world where design represents an opportunity to add value to products and services at a relatively low marginal cost, design is a central tool for creating competitive advantage. In this sense, a leading-edge design school can become an instrument for economic growth.

The birth of the great public universities helped to bring about America's transition from a growing industrial power at the end of the nineteenth century to a central world power at the dawn of the twenty-first century.

To protect and nurture its role as the world's "sixth largest economy," California must invest in its university sector. Here, the proposal represents one of several choices. The University of California can and will grow, as all great universities do, and advanced industrial democracies depend on universities for their survival as well as for their growth. The question is which investment among competing alternatives will best serve the needs of the university and the citizens it serves.

This report makes a compelling case for the design as a promising area for investment, linked to a rich and increasingly important range of California-based industries. While the university must invest heavily to launch the school, the school will later attract funding and resources to the university in ways that cannot be imagined today.

Together with several colleagues, I recently had the opportunity to study the design sector in one of the candidate nations applying for membership in the European Union. We found that the transition from a comparatively primitive economy to a sophisticated and robust economy involves a steady progression upward along what we labeled the design maturity scale. The journey involves a transition from subcontracted production by foreign firms to production for locally owned businesses, from domestic sales of general goods and services to export sales of goods and services, from manufacturing simple parts to manufacturing whole products, from anonymous products to branded products, and from production oriented business to market oriented business. In some cases, it also involves a transition that includes growth from material to immaterial products,

5 Clark 1940
6 Bell 1976; 1999.

from products to services, and from services to experiences. [7]

One factor that makes the UCI School of Design so interesting is that it proposes four specializations covering the comprehensive range of issues in the design maturity scale. Interaction design, product design, and spatial design, together with design studies makes a rich approach that brings all levels of research and all areas of inquiry together in one proposal.

The proposal for the School of Design at the University of California, Irvine, describes a promising venture. I believe that it will prove to be a profitable investment for the university in economic and academic terms while contributing to human knowledge and to the design profession.

Building a design school from the foundation up offers an unparalleled opportunity to shape a new kind of design education. The planning process – and the learning process – involve valuable lessons that can be put to good use by other university-level design schools, including those with strong traditions of their own.

One aspect of this project that makes the process of wide interest to the field is that fact that the proposal itself is available on-line to the entire university community – and to the wider communities of design research and design education. The report [8] is available for free download in PDF format at URL: <http://www.evc.uci.edu/growth/design/SoD-proposal.pdf>

This report offers design schools a chance to benefit from the three-year process of research and development that will – one hopes – lead to a School of design at the University of California, Irvine. To complete their work, the authors reviewed the state of professional design education today around the world, along with design research and design research training in the world's leading universities.

In today's economic climate, few universities – and fewer design schools – will have the budgetary resources to build (or rebuild) design education on the level of a new purpose-built school. What this report offers to existing schools is an opportunity to learn from improvements and changes implemented elsewhere, adapting them to local needs and opportunities. In planning a design school for the 21st century, the authors of this report have written a research and development study on which other schools can build as they shape their programs for the future.

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[7] Mollerup, Friedman, Korvenmaa & Landerholm 2003.
[8] UC Irvine School of Design Committee 2002.

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Wearable Computing and Wireless Networks

A Design and functionality analysis of the XYBERNAUT MATC in the context of flipflop

B Resource guide to DIY community wireless networking.

A Design and functionality analysis of the XYBERNAUT MATC in the context of flipflop

Primary evaluation:
ambientTV.NET (6 testers).

Additional consultation:
Gavin Starks (Tornado Productions);
Kass Schmitt (NYC Wireless).

Requirements:
A light, robust, portable hardware solution that can transmit audio and video (and receive at least audio) over WLAN (IEEE 802.11b) over 1–2 km. The hardware is to be worn by a performer as s/he walks around outdoors and dances indoors (capoeira/breakdance).

For more information on the performance piece see <http://www.ambientTV.NET/3/flipflop>.

Hardware:
2 sets of:
Xybernaut MATC 400 MHz Celeron/200MB RAM /10GB HD with thumb mouse, wrist keyboard, headmounted display (HMD), USB webcam, earphone, microphone, USB floppy drive, battery and holder, spare battery, charger, power adapter, battery pouch, belt & headset, 1 x wrist mounted LCD panel.

Additional hardware provided by Ambient Information Systems:
2 x PCMCIA WLAN 802.11b cards, USB CD ROM, Assorted webcams, microphones, headphones, Access point to WLAN and Real server.

Software:
Windows 2000 Pro, Netstumbler (WLAN utility), iVisit (videoconferencing), RealProducer, Helix Producer, RealPlayer (encoding/streaming), Inference Group, University of Cambridge: Dasher.

First impressions:
The units arrived well packaged. From its external appearance, the MATC appears well built, and the attachment hardware (belt and pouch) for the main unit and battery pack is secure and comfortable. Documentation was adequate for the main unit, but very limited for the peripherals (for example: no assembly diagrams for the headset; no specification for the headmounted display to indicate voltage of DC OUT socket).

General

Functionality
For the initial testing and feasibility study, Windows 2000 and a driver for a PCMCIA WLAN card were installed from a USB CDROM drive. (For future trials, the MATC will be configured as a dual-boot Win/Linux system.) From the start, one of the MATC units has proved unreliable – it boots only intermittently, indicating a poor connection between motherboard and HD. For most of the evaluation we have been limited to using the one reliable unit.

MATC was able to run RealProducer / Helix Producer and iVisit adequately. Predictably, frame rates and connection reliability were higher with iVisit videoconferencing than with Realvideo streaming. iVisit tests were made between both units (when both were functional) and between MATC

and PC and Macintosh laptops, using peer-to-peer connections on the WLAN. Realvideo tests were run using AmbientTV.NET's wireless access point and Tornado Production's streaming server, with streams being replayed via the same access point.

MATC runs the Cambridge Inference Group's Dasher predictive text input program well (given the limitations of the HMD screen). If fully integrated with the operating system and other software, Dasher would make the keyboard redundant.

Power

Power supply socket – The power socket, on the MATC body, and the plug, from the battery holder or charger, are nonstandard and could be made much smaller. The power plug is too wide – it overhangs the adjacent headphone socket to the extent that a standard headphone minijack plug cannot be inserted fully into the socket (Figure 1). This is a major design fault.

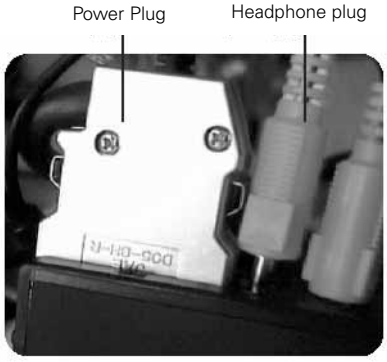

Figure 1. Power Plug obstructing headphone socket.

Battery life is adequate and charging is reliable. However, the on-battery charge indicators do not function and there are major power supply problems when the charger station is used to recharge a battery while simultaneously powering the MATC (this procedure is not contraindicated in the documentation) – the power to the MATC fluctuates and it crashes.

Standby functionality – There appears to be an issue in waking from standby mode. The unit does not respond to any keyboard or mouse input, and a forced reset is required.

Ports and slots

USB – three USB ports are need to plug in the supplied keyboard, mouse and webcam, but there are only 2 ports on the MATC body. This necessitates the use of a USB hub, encumbering the user and adding to the tangle of cables (Figure 2).

Figure 2. Additional USB hub required.

PCMCIA card slot – the double card slot has a hinged lid (with cutout for cables) to protect the slots and installed cards; however, the lid cannot be closed completely once a standard WLAN card is inserted (Figure 3). This results in the card being left exposed and vulnerable, and makes damage to the card slot lid itself more likely.

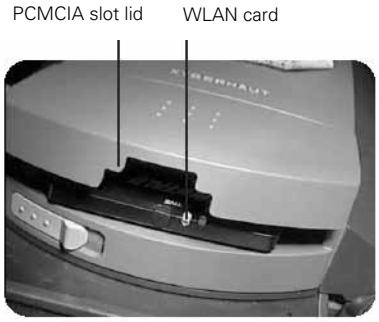

Figure 3. PCMCIA card slot lid does not close.

Sound

The soundcard is unusually noisy, and makes continual buzzes and hiss. This may be a driver issue; as yet we have been unable to resolve it. The lapel remote control for the earphone and microphone ought to have included independent mute and gain controls for the two devices, instead of a single mute switch.

Peripherals

Trial results with the peripheral devices are reported individually below. One general point of note is that the use of a several wired peripherals led to a tangle of cables – "cable spaghetti" (Figure 4). A more practical portable solution would employ Bluetooth or a similar wireless protocol.

Figure 4. "Cable spaghetti".

USB webcam

The camera sensor quality is adequate, although it does not perform as well as some other models in conditions of low or very bright light. There is a major problem with the camera mount. The ball mount has a limited range of tension adjustment (by screw), but cannot be made stiff enough to hold the camera steady while the user is moving. The camera works loose after a few moderate shakes of the head (Figure 5).

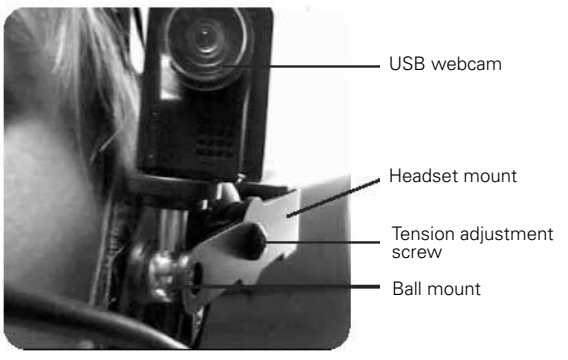

Figure 5. Headset mount for USB webcam.

Keyboard

The wrist mounted keyboard has a positive feel, though substantial pressure is required to operate the keys. The keys could have been made to switch under lighter pressure, with a keyboard lock switch to prevent accidental keystrokes. The wrist band, which holds the keyboard, is comfortable, but it is asymmetric and sits differently on the left and right arms. On the left arm, the keyboard sits on the extensor aspect of the arm, whereas on the right hand side, it sits on the flexor aspect. Also, when mounted on the right arm, the keyboard cable emerges from the distal (rather than proximal) end – leading to more "cable spaghetti". The design could be modified to allow for either orientation on either side. Perhaps a more elegant solution overall would have been to use a textile keyboard, or even a cursor-based predictive text input system.

Mouse

The USB thumb-mouse or mini trackball has full three button functionality. Most users felt that there should have been greater resistance to ball motion. A mouse holster, for storing the mouse when not in use, would be very handy.

Displays – general

The resolution of both the HMD and wrist-mounted LCD is low at 640 x 480. This provides insufficient screen area for many applications. Functionality would be passable were it possible to attach a third-party display for configuration of software, prior to use, but this is discouraged by the use of a proprietary A/V connector (without adapter to standard VGA) on the main unit.

Displays – HMD

The HMD can be mounted on either side of the headset. LCD brightness is adequate for indoor conditions but not for bright sunlight. The supplied silvered and half-silvered screens are operationally very similar. Both require very critical adjustment to be at all visible, let alone adequately so. Even when oriented optimally, both screens still require the user to squint with one eye to view the screen. Some users even felt it necessary to close the other eye when reading the screen. Detailed work or feedback from text input is very difficult and almost impossible when

on the move. Both screens are equally straining on the eye and require the user to divert their attention very significantly from their environment, which is not only of little utility but also dangerous. Also, since the user needs to squint, with both eyes open the fully silvered screen appears semi-transparent, so there is effectively little difference between the two screens. The screens are also quite fragile, and are as liable to snap as they are to slip safely out of their mount. More robust alternatives to the HMD such as lightweight stereo goggles that project images at infinity into the user's field of vision have been commercially available for a number of years.

Headset

The headset, which carries the HMD, USB web-cam, earphone, and microphone, is light, but not adjustable. This was felt by all testers to be a very serious oversight. On most of the testers, the headset was too loose, and in combination with its side-heavy design (most of the mass being at the extremities of the headset, at the webcam and HMD), this led to the webcam and HMD swinging out of optimal alignment following any moderate head movement (Figure 6). The open backed design of the headset could also have easily accommodated either a cutaway or a grip for the earphone lead, to safeguard this vulnerable component.

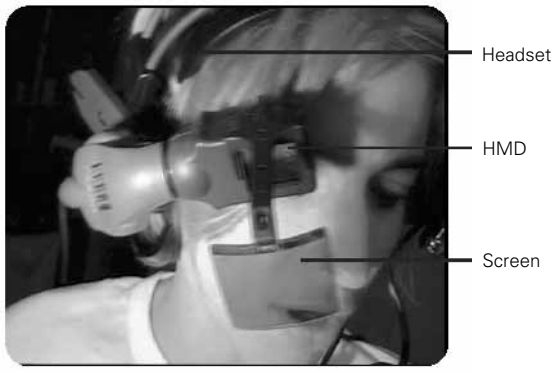

Figure 6. HMD slips forward with moderade head movement.

General ergonomics

Although the biggest single problem ergonomically was with the HMD / headset combination, a more general issue was of the proliferation of wired peripherals (and their associated cables). When the keyboard, mouse, battery, HMD, webcam, microphone, earphone, and USB hub are connected, there are 7 cables running around the user's body. Long loops of slack cable form as the body changes shape. Apart from the severe safety (tangle) hazard, there is a constant risk of unplugging cables; the user must at all times be very conscious of the various components and cable runs. Using a wireless solution such as Bluetooth, and with a mouse integrated into the keyboard (or the keyboard ditched in favour of a predictive text input system via a more sophisticated mouse-type hand controller) and with the camera, earphones, and microphone integrated into display goggles, the number of peripherals could be reduced to two and cable runs almost eliminated. The result would be a much more practical and discreet machine.

Ruggedness

With large fan vents on the body, MATC is neither water- nor dust-resistant. None of the ports have rubber seals (for deployment when the port is not in use). A practical wearable computer needs to be ruggedized at least to meet agreed standards such as the US MIL-STD-B108 specification – movement-based performance makes similar demands on hard-ware. The Panasonic Toughbook is an example of a robust notebook that exceeds these specifications. Ruggedness (and elegance, for movement-based work) also requires that peripherals be connected wirelessly wherever possible.

Aesthetic considerations

The philosophy of ambientTV.NET to treat form and function as equally important and mutually reinforcing considerations in any contrivance, whether mechanical, electronic, or more ephemeral (compositional, narrative, etc.). Nevertheless, we recognize that form must in many cases follow function, and we strive to reflect such exigencies in the overall aesthetic of our productions. That MATC looks like more like an early 1980s vision of the future computer than actually existing solutions in the year 2002, is no hindrance to the development

of flipflop – and actually helps us to illustrate the recent history of human interface design.

More particularly, the MATC is not discreet, and when worn in the street elicits very strong reactions (of a range of modalities) from passers-by. While we look forward to the challenge of integrating such reactions into the narrative structure of flipflop, there is the issue of the personal safety of the roaming performer (especially given that s/he would certainly be exploring some less salubrious neighbourhoods). We are currently considering necessary safeguards.

Other general considerations

The unit as a whole is bulky, heavy, fragile, and noisy compared to a wireless-equipped PDA of comparable processing power. MATC has neither Bluetooth/WLAN nor IrDA (infrared) wireless technologies inbuilt. High-specification PDAs are available equipped with both WLAN (802.11b) and Bluetooth cards, and many mobile phones are IrDA and Bluetooth-enabled. A portable computer ought to integrate Bluetooth and WLAN antennae at the very least, if not the cards themselves.

The choice of the PCMCIA form factor is also questionable. WLAN, flash RAM and other types of cards are available in the smaller CF (compact flash) format. A CF slot could also be used for a microdrive, so dispensing with the large, heavy 2.5" HD.

The PC platform looks increasingly to be a poor choice for a wearable computer, given developments in PDA and mobile phone technology (especially considering advances in low-voltage processor design). We feel that the future of mobile technology lies not in making computers wearable (even a desktop can be made wearable, given enough tape and string and some big batteries), but rather in building processing power into garments.

Conclusions

Within the context of flipflop, it is clear that Xybernaut MATC will not survive intact on the body during a vignette involving breakdancing or capoeira. However, the unit is functional, if awkwardly so, as a perambulatory streaming unit, and it will be in this manner that it will be deployed. Where energetic physical activity or discretion is required, a smaller and more robust solution will be used. We have, for example, recently begun testing UHF video microtransmitters in combination with miniaturised board-mount and surface-mount CCD chips and microphone capsules (the entire wearable assembly being the size of a mobile phone). Video-enabled mobile phones are another possible avenue. These alternative solutions have the disadvantage that they do not make use of wireless community networks (and their peculiar socio-political context, which is one we wish very strongly to draw attention to). So, despite disappointing trial results with the MATC, wearable wireless (802.11b) streaming solutions remain vital to the conception and execution of flipflop.

B Resource guide to DIY community wireless networking

Local Wireless Networks: an introduction

Independent groups in cities around the world have been developing non-profit wireless neighbourhood networks using a technological standard known as 802.11b, or Wi-Fi. Volunteers hook up a wireless card to their home computer, place an antenna on a rooftop or in a window, and broadcast a signal that can be received by anyone who is located within a few blocks and has a similar wireless card transceiver on their computer. The immediate result is a local-area network like those found in schools and office buildings. In some cases this might include a free link to the volunteer's Internet connection.

Members incur the one-time costs of setting up an antenna and wireless card to link to the network. While some of these networks are designed to share bandwidth or Internet access, others are building what amounts to a high-speed community intranet. Wireless networks grow with each new user or participant.

ambientTV.NET's wireless broadband wing

Having established a node and server at the ambient-TV.NET space, ambient.wireless is currently:

– participating in the construction of infrastructure for the local wireless network

– developing projects and events that scrutinize and exploit this technology, and

– providing wireless broadband access to local artists and community initiatives.

802.11 NETWORKS info portals

<http://www.freenetworks.org/>
FreeNetworks.org is a voluntary cooperative association dedicated to education, collaboration, and advocacy of the creation of free digital network infrastructures.

<http://www.bawug.org>
With the understanding that wireless access can and has the potential to significantly reduce the cost and increase the ease to share resources and access to the Internet, the Bay Area Wireless Users Group was founded to promote wireless use for the Greater San Francisco Bay Area.

<http://wirelessanarchy.com/>
WirelessAnarchy is about creating your own long range infrastructure, without having to pay anyone or jump through government hoops. Cheaply and easily, using off the shelf equipment, and a little ingenuity, you too can create your own net.

Recommended antennas DIY guides

<http://users.bigpond.net.au/jhecker>
How to Make a Simple 2.425GHz Helical Aerial for Wireless ISM Band Devices by Jason Hecker

<http://www.aaschool.ac.uk/antennaa/buildantenna/index.htm>
Build your own antenna by Adam Cosey

<http://www.ambientTV.net/wireless/project/020715diyguide/guides.html>
ambientTV.NET's directional antenna guide

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ambientTV.NET:
ambientTV.NET is a crucible for independent, interdisciplinary projects ranging in form from installation through documentary, dance, and theatre, to sound and video composition and manipulation. We continue to develop social and technical infrastructure and promote network architectures that allow explorations of alternatives to current socio-political and economic practice. Techniques and effects of live data broadcasting and transmission provide theme, medium, and performative space for many of the works. Recent and current projects include:

– A/V DINNERS – a live/streamed multi-sensory gastronomic event that addresses ritualistic and signifying dimensions of food gathering, preparation, and consumption.

– ON AIR – internet radio broadcasts of emerging musicians from the local community, rebroadcast on remote FM stations.

– ogo glocal! – workshops and guides for DIY wireless community networking.

– Spy School – a series of exercises that scrutinises public-private boundaries under the constant surveillance that is part of post-9/11 life. The second exercise in Hull involved the Brazilian dance/martial form capoeira outside the house of slavery abolitionist William Wilberforce.

– flipflop – a solo theatre performance for two bodies in multiple locations, woven together by telematic links between performance space, a performer, street space and a wireless wanderer.

– Virtual Borders – a hypermedia database documentary about the Akha people of the borderlands of China, Laos, Vietnam, Burma Myanmar, and Thailand.

Complete research available at:
<http://www.ambientTV.NET/3/flipflop/>

E-Health and Multimedia, an Experiment in Synergies

1 The objectives: creating novel learning strategies to get wired

The first objective of the project was to create a learning environment to enhance a whole variety of interdisciplinary competencies. Two very different faculties were brought together, the target group was a rather extraordinary one and the technology to be used is of an awe-inspiring novelty that the project felt like breaking ground in many professional, cultural and social fields. Faculty and students of the Health Care faculty were to cooperate with their colleagues from the Academy for Media and Design in a project of building bridges. The project in a nutshell: students of the Faculty of Health Care study the situation of the "Junior Seniors" with access to the internet, to come up with a specific ICT-tool, designed and produced by the students of Communication and Multimedia Design programme.

As to the (learning) outcomes: the aim was to enhance professional awareness and the competencies (knowledge, skills mastered and professional/social attitudes). Also we wanted the university to act as a change agent, with influence on the stakeholders' organizations.

2 Backgrounds: societal changes and New teaching strategies

It should be realized that we have entered a new brave world in which a terrible beauty is born. ICT is here to stay and we should be aware of the far-reaching implication it is likely to have on a changing society because the old paradigms are being transformed. More than ever before should the universities realise that they are to be change agents helping the societal revolutions along and supporting the members of the public to learn and cope with change.

The internet is shaping itself en route and many of the users tend to graze, browse and surf with only little focus. A modern media user is born: the Homo Zappiens [1]. The societal changes and their sociological impact have been discussed by people such as Manuel Castells, who writes about the Network society in the information age [2] and Alvin Toffler [3], who was able to predict and describe the changes over thirty years ago.

People started to recognize the implications for the educational community and for the society as a whole and this had an impact on teaching though staff may find it still very difficult to pick up ICT as a basic tool of their trade, many feeling they would be opening a pandora's box if they were to introduce IC-technology in their courses [4]. Others feel that the promises made have not been realized yet as was shown in the "Web-based Education Commission" -report called "The Power of the Internet for Learning: Moving from Promise to Practice" [5].

In the Katholieke Hogeschool Limburg, an affiliate of the "Association Katholieke Universiteit Leuven", a lot of attention is given to educational development and the introduction of new teaching and learning strategies. New learning paradigms are developed and the e-health project serves as a generic example.

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1 Term used by Wim Veen, Delft University of Technology, the Netherlands. E.g. <http://www.library.tudelft.nl/iatul/Programme/Conference_programme/Veen/veen.html>.

2 Castells 1996a; 1996b; 1996c.

3 Toffler 1970.

4 Van Ryssen 2001.

5 Web-Based Education Commission 2000.

3 Project introduction

The Health Care students were adult learners on a Bachelor bridging course, based on APEL[6]. The students from the CMD are Master students. Because of the asynchronous set-up they also had to "study" each other against the backcloth of the whole of the project: the production of a web based tool for junior seniors who are wired. The objective was to introduce the concept of E-Health and put it to good use enhancing the quality of life for the target group. A project bid was written and submitted with the King Baudouin Foundation, which runs programmes for amongst others Johnson & Johnson[7] to get some support.

4 What is it all about?

A vision text was written and examples studied. Carelink [8] of Sweden filled the bill. The following is part of the vision text [9].

The progress medical sciences are making seems to know no frontiers. More years are being added to our life expectancy so we seem immortal. Growing old is now a life ideal. But we get confronted with the opinion that this way of growing older does not entail that old age is our happiest time hour. Getting older and depending on care does not equal as high quality. There is a change in paradigms here too and maybe a change in point of view: no longer will only doctor or nurse decide on the quality of the life of the senior client, the clients too are to make decisions, influenced by subjective perception and by the appreciation of the own existence. This certainly holds true for the older client wishing to live autonomously in the home environment; and for as long as possible.

Every senior citizen possesses a unique personality, which should lie at the base of the care giving, together with respect for the human autonomy of the individual. This is a result of our individualised society, and is to be recognized as such.

New concepts have cropped up, e.g. "lifelong homes". The client wishes to stay in his house as long as possible and live a quality life in a familiar environment. Every form of self reliance should be encouraged and supported and communication is the keystone.

Computer technology will be a major aid. E-Health will form an key modernising element in the care giving community, with a significant added value in the way the care is experienced.

The ageing of our society, with acute shortages in care givers, means and opportunities, force us to jealously guard the quality standards of care and develop new strategies. The current quality standards in our society also force us to develop a community where the elder can stay in their biotopes as long as possible. E-Health is a novel concept that will help realize this.

From a holistic approach of the human personality (personalism) the older client in his own home is to be given the means to keep a window on the world. This "window" should also be meaningful. John Locke is wrong in saying that every senior is like a "mussel".

Implementing E-Health in a fundamentally ethical way is not simple. It is a totally new health care area and it acts as a kind of interface between medical informatics and public health care. It deals with health care services and the information offered through the internet and related technologies. It defines a particular frame of mind, a thinking method, an attitude and a commitment to improve the health care systems embedded in the society and in local, regional and even global communities.

5 E-Health: new opportunities for old challenges

A good definition of E-Health was published by Gunther Eysenbach [10]. It is not just "Internet medicine", it is virtually everything related to computers

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6 APEL: Accreditation of Prior and Experiential Learning. In this case the students were all in their thirties and they worked as nurses (hospital and home care).

7 For more information on this organization, visit <http://www.kbs-frb.be/code/page.cfm?id_page=147&lang=EN>.

8 Visit their web site: <http://www.carelink.se/>.

9 Huion, Joris & Van Gorp 2002.

and medicine. The term was first used by industry leaders and marketing people rather than academics. They created and used this term in line with other "e-words" such as e-commerce or e-solutions in an attempt to convey the promises, principles, excitement (and hype) around e-commerce to the health arena, and to give an account of the new possibilities of the Internet. Intel, for example, referred to e-health as "a concerted effort undertaken by leaders in health care and hi-tech industries to fully harness the benefits available through convergence of the Internet and health care."

It is clear that e-health encompasses more than a mere technological development, though. The "E" does not just stand for "Electronic". The E also stands for: efficiency, enhancing quality, evidence-based, empowerment, encouragement, education, enablement, extending, ethics and equity.

6 Project proceedings

The Health Care students did in-depth research at grass root level, they dealt with the concept of E-Health, studied examples and made a needs analysis, on the basis of which "content" was defined. The technical part of the project, conceptualisation and development was done by the CMD students.

7 Communication- and Multimedia Design (CMD)

CMD is a 4-year multidisciplinary (graphic design, marketing, ICT, communication, audiovisual design) master course developed by the Katholieke Hogeschool Limburg and the Dutch Hogeschool Zuyd. Cmd is a humanity driven multimedia course: its curriculum starts from needs in society, interfacing our everyday experience with the opportunities offered by new technological developments.

The course trajectory consists of cases, modules and contact zones organised according to their screen position: establishing the first contact on the screen; organising information behind the screen, longing for transparency through the screen, going for immersion in the screen. [11]

8 Course design

The e-health site was conceptualised in the 3rd-year elective module "It Takes a Community to Tango" and designed in yet another: "Content is King".

9 'It Takes a Community to Tango'

The students got a general concept of a community site following the design principles laid down by Amy Jo Kim. We analysed types of communities, the issues of identity, a sense of time and place, the problems related to participation, government and profitability.

The students were asked to tackle this assignment in an analytic, empathic and creative way.

9.1 Design: challenges, suggestions, experiments

We will walk through the actual design. Each time we will discuss the challenges, the possible solutions and the experiments.

9.1.1 Understanding our audience

In thinking up the concept we could rely on an interview done by our client. It clearly defined the topics to use as common ground and the level of the end user's computer literacy. The interview showed that the interviewees were unfamiliar with the phenomenon virtual community but they did know how to chat, search, surf and e-mail.

The end users are the young senior citizens from Flemish Limburg wanting to communicate on health issues, who want to stay at home. The community site will decrease their feeling of loneliness and isolation and increase their feeling of wellbeing, of being connected. The secondary target group consists of family care givers who often belong to the same demographic group, and finally the site will also welcome younger people seeking advice.

Interfacing
Interviewing the adult Health Care students, the CMD-students fully understood the difference in

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10 Eysenbach 2001.

frame of reference between them and the client-end user, between computer nerds and nurses with experience. Thus, the CMD-students concluded that from the very beginning our target audience should be helped with how to use the computer and how to "live" in the community.

Therefore, they suggested:
– a user manual both as a leaflet in the physical world as well as a help sub site in the community itself;
– a virtual host as well as off line meetings where the more experienced senior shows how the e-health community site works.

9.1.2 Community identity

Communicating your vision is very important to attract and keep your target audience.

This vision will be realized through words, images, features, policies, and even the social dynamics that take place within your community. [12]

CMD-students opted for a serene atmosphere with icons that fit the everyday life of the junior senior, soft colours, no flashy animations, larger font size, and an audio-mode for articles.

The most difficult part of establishing the community's identity proved to be the writing of the backstory. Transparency being one of the major criteria, the backstory is of vital importance because it draws in our visitors. It allows them to identify with the storyteller, it persuades them to start telling their own stories. And that is the major challenge of a community site: to acquire participation.

9.1.3 Sense of time

This proved to be the easiest part of our concept. We all agreed we should organise both on line and off line events (chat session on healthy diets for instance, and attending a presentation on the same issue). The chat session could have an audiovisual introduction during which several specialists are being interviewed.

Rituals were suggested to mark the journey from a new member to a new leader. Other rituals were suggested such as Christmas, birthdays, community birthday, mourning.

One team proposed to design a default page for new members, which would explain everything you need to know about this community. This page would disappear after logging in more than five times.

9.1.4 Sense of place

A virtual community should be a third place where people meet to communicate. Our client favoured the community site as a virtual village. This metaphorical approach simplifies the use of the virtual community by virtue of its associative power, senior citizens are familiar with this social structure and use this real life similarity to navigate through the community. Thus the church clusters spiritual topics, the library compiles articles written by experts, in the local store we discuss food issues, at the doctor's, the dentist's we can read FAQs related to their expertise, the park links to discussions on free time, a bank allows discussions on financial issues, in the city hall members can post their articles, announce deaths, marriages and births (of their grandchildren for instance).

Problems
Do we want the community owner to screen our messages before they are posted? We would, but it is almost impossible. Instead we introduce an easy shame feedback icon and a complain link to the community manager.

Every theme will be introduced by icons. For instance while members are chatting they always know where they are. However, do we rely on traditional icons or do we introduce new ones? We favoured the last possibility since during our debate it was rather difficult to find icons that were mono-interpretable and we also feared some icons would be very hard to "read".

Do we want our visitors to register? Yes, because it increases the feeling of trust in our community, it

11 <http://www.klim.be/abk/cmd>.
12 Kim 2000, p.19.

allows us to update our community. No, because it deters visitors. Our end users may have the impression they have to pay for it and they don't like feeding personal information into the computer.

So, we allow visitors to browse through our site and lurk while others are communicating before they become members: they are guests. We clearly stress the word free: free registration and allow the visitor to say no. Thirdly we opted for a gradual membership: first step (name), second step (more demographic information) until the last step which is your personal homepage. Choice is the key word.

9.1.5 Sense of self

This was a more problematic issue due to conflicting attitudes. From our client we already know that our target audience is rather reluctant to disclose any personal information, and at the same time we know that the same end users are rather distrustful about participating in a virtual community. This is problematic because real identities increase the feeling of trust, real people create rapport and members want to "bond" with them. And to make things more complicated, the more people contribute, the more your community is perceived as trustworthy.

Both client and end user fear their information will be abused for commercial purposes.

Another problem is related with the use of role-playing: people choose to participate with another identity from real life. Professing to be someone else is quite common in virtual reality, but it could be quite dangerous when talking about health advice, for instance.

Solutions
A code of conduct, privacy statement and back story should stress a commitment to honesty, reliability and how this will be achieved. Community leaders and the experts have an elaborate public profile because members will have to trust them. Specialists will always be screened by the community leader: a symbol is put next to their names. Anonymous guests may be offered limited access to get an idea of what the community site is about. There will be sections in our community site that are more playful. For instance, using nicks in the park debates is perfectly ok. Avatars can be used as well, as long as we have your real name in the system profile.

9.1.6 Sense of organisation

It is very important to introduce the community leaders from the very beginning: a contact page would be very useful. As this is a new community, instructors explaining how to navigate through the community site are very important. Our leaders should be recruited from the physical community of the senior citizens. More elaborate community sites need different kinds of leaders, but in our case we should invest in a few multiskilled leaders. They welcome you, become your personal instructor, moderate debates, provoke participation, collect and even write articles and organize events. A leadership manual should be written and some face to face training sessions on leadership should be organised. When the community expands we will have to implement different leader roles, split our community into subgroups. So, if we stick to our village metaphor we start with a mayor and some councilors.

10 In retrospect

On the whole I think both parties have a thorough knowledge of needs and possibilities of e-health and community sites. Yet, in retrospect I would change a few things.

One of the major changes would be the creation of a focus group of primary end users, right from the very beginning. Empowering contributors with specialist knowledge should have been done sooner as well. Again, I hope we will have master students who will engage in an ethnographic study researching community production.

A community site is a compilation of individual stories. Each community site needs a powerful narrator. A genre study on what kind of narrators lead to which kind of communities, would be much appreciated. If we use existing fiction and cybernarratology to start up a community site it would be fascinating to define critical mass of

contributions and threshold values to find out when members start communicating using their true identity.

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With thanks to the Health Care and CMD students.
The full article can be obtained on request.

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Making Inclusive Design Work: Design Empathy

It is important that products, especially products for public use, are accessible to all and inclusive. Many people have less than perfect abilities, but consider themselves still normal. They may, however, become disabled by certain products and environments which deny their abilities. However, in practice implementing inclusive design in the design of products, enviroments and services faces obstacles. Some may be financial: special consumer groups have not been a large enough market segment but with the ageing of western populations, the 50+ and even the 80+ population is going to be a population of consumers with expendable income [1]. Other obstacles may lie in the attitudes and perceptions of people who consider themselves "normal" and who are not aware of the advantages that inclusive design can offer in exchange for the necessary efforts [2]. From a user-centred design standpoint, however, defining the relevant demographic or target user group is just one part of the process of doing better design.

User-centered design (UCD) follows a few simple principles. It acknowledges expertise: designers are experts at designing and users are experts at using, and for the best results, all experts should be informing the process. User-centred design also takes iterative prototyping seriously. The sooner design ideas can be concretised and communicated in some form of models or prototypes, the better. These prototypes are then used by designers to learn about the design solutions together with the users. These testing iterations then lead to new design versions and repeated evaluations and testings. [3] The opposite of this process could be called designer-centered design. In this process the designer conducts all these stages on his or her own, often resulting in a faster process but with a higher risk of developing a product that is not acceptable or suitable for all or some of the end users. Different products and markets require different approaches – when it comes to fashion and future trends it is probably better to let the designers lead but when it comes to developing tools for specialised user groups or the general public, user-centred approaches are required.

Design empathy

Designers know that the ways in which people use and experience their products can be predicted only to a certain degree – although user centred approaches help in increasing this predictability. The user experience is the sum of all the elements that are perceived by the user as related to the product. Designers naturally wish to influence the outcome and provide for as positive experiences as possible. The only way to understand other people's experiences is with empathy [4]. Empathy is the understanding of the experiences of others in situations without directly being in them yourself – an emotional and imaginative action which uses the human qualities of the designer. Each person responds to situations based on their prior experiences, emotional state and mood, the context and what they were intending to do [5]. In order to support positive experiences, designers must understand what experiences mean to others and why they respond the way they do.

Designers have always been good at actively drawing inspiration from things and places they encounter.

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1 Coleman 1999.

2 Jordan 1999.

3 See e.g. Stanton 1998, Jääskö & Mattelmäki 2003, Säde 2001.

4 Dandavate et al. 1996, Segal & Fulton Suri 1997, Black 1998, Sanders & Dandavate 1999, Mattelmäki & Battarbee 2002.

5 Mäkelä & Fulton Suri 2001.

They study existing objects, read magazines, visit interesting places, collect samples and materials, make moodboards and apply a broad range of inspirational tecniques. Inspiration, in the applying definition, is "something that moves the intellect or emotions" [6].

As results of a design process, objects embody design thinking, and by studying objects the underlying decisions can be derived at least to some degree. It is a pleasure for a designer to detect what ideas have gone into a product. Equally it can be interesting and inspiring to understand why a certain action is done a certain way and not the way that would seem most sensible or safe or practical from the designer's point of view. Objects and contexts of the real world allow designers use their skills in learning with all their senses. The same sense of curiosity and a willingness to understand people's experiences is what also makes learning about other people not a burden, but a source of inspiration [7].

A common way to think of learning is by reading or listening, but learning by doing is important as well. Designers tend to be visually oriented, emphasising things that are learned by seeing and inspiration through visual channels. However, our knowledge of the world is embodied – our body and all its senses are a tool for experiencing and learning. We can never completely understand what the world of another person is like, or what are their experiences, but by putting our embodied intellect and emotions to work, and collecting information about different aspects of experience through what people say, do and make [8], we can create an empathic understanding of the experiences of the others in the situations they encounter. Design empathy thus applied is an attitude, a denial of prejudice and judgement and a willingness to create an emotional connection with the situations of others.

"You are not normal people, you are perfect people"

What is considerend "normal"? Most people have an underlying need to "be ordinary", or at least have the freedom to define in which way they are not "ordinary". This includes people with limited abilities as well. The part of the population that does design tends to forget that their abilities are closer to "perfect" than "normal". "Perfect" people must acknowledge, that if they design for themselves, they may unwittingly exclude those who are "less perfect" and in fact, create severe difficulties for them.

Inclusive design is about redefining what belongs to the concept of normal. Able-bodied, 25-year-old engineers should not be considered the norm, but where to draw the line? A group of students at University of Art and Design Helsinki were taking part in an inclusive design project. Their challenge was to understand the issues behind various disabilities and design something that would be accessible to a wide range of individuals. But,what works for a deaf person will not work for a blind person and vice versa – trying to embody this kind of understanding is not easy but it has to be done. They approached it from the experience point of view. By choosing the university as their location they filmed several short clips that illustrated the experiences that people with different disabilities might have. A person in a wheelchair tried to find the way to the student bar and battled with getting a heavy front door open. A person with very limited visual field was looking for a toilet and was told to go "that way and down the stairs". A very short person had to ask for assistance at the library to get books from the shelf and a deaf person was trying to ask directions to an office by writing on a note pad. The video was filmed at the eye-height of the person, showing what they would see and creating an intimate, first person sense. Those short clips were enough to create a feel for the kinds of perspectives a designer of a public space needs to consider. The clips were calling for an empathic response to the problems these people have in environments were "perfect" people do just fine.

Engaging the body and the senses

Because learning is embodied, it is difficult to imagine the experiences of those who sense and learn about the world in a different way. Besides, designers have to extend their imagination to encompass many

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6 Merriam Webster online dictionary.
7 Leonard & Rayport 1997.
8 Sanders & Dandavate 1999.

different and contradicting combinations of abilities – for example hearing impaired as well as visually impaired. Design is always complex, but involving a broad range of abilities, as is necessary in inclusive design, increases the complexity greatly. When there is no one single configuration of abilities to describe the user requirements, the designer is first at a loss – how to comprehend contradictions and yet keep the complexity alive?

It is also necessary to understand the cultural and ethical aspects that relate to various abilities. Design solutions that dictate what a person should do and fail to respect the freedom and desire for "expressing being ordinary" cannot be successful [9]. As an example, visual impairment comes in many types, affecting different aspects of vision in different ways, and ranging from partial to complete loss of vision. A sighted designer may not know that a visually disabled person might do not always like use the white cane. Obviously, the cane would make crossing traffic safer by communicating the disability to drivers, but if the partially sighted person can rely on other environmental cues, they may prefer the higher risk and not draw extra attention to themselves and their disability. This fact could not be learned by studying canes as objects, but by observing and talking to visually disabled people. At first, the most striking thing between different abilities are the differences, but when we understand people with disabilities just as people, similarities can be found as well.

Feeling empathy for problems is a good start, but for inspiration it is necessary to get one step closer. Even in inclusive design it is possible to design for opportunities rather than fix problems. Focusing on activities, abilities and positive action can help seeing the situation with curiosity, which is when it can become inspiring. Designers must feel that they have opportunities and that they are operating on familiar ground.

Aesthetics is not just about things looking beautiful, aesthetic experiences belong to all the senses. When designing for a richer range of sensory experiences and functions, the product can help the deaf to communicate with each other and with hearing people, the visually disabled to navigate with more confidence and all of the "perfect people" to function better in situations of stress, diverted attention as well as noisy, sound-sensitive or poorly illuminated conditions.

Inclusive design cannot succeed merely by following published guidelines. What is required is a user-centred process that allowes both observations and factual knowledges as well as empathic, experience-oriented approaches between designers and real target users. In this way designers can realise for themselves that they can draw inspiration from others without giving up their skills as designers. As always with user-centred design, the result is higher confidence in design decision, a better knowledge of the target users and their context, and better chances for design that respects a full range of "normal" people on their own terms, not on the terms of "perfect people".

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[9] Jordan 1999.

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CinemaSense Portal and Neural Network Analysis Method for Supporting Students of Linguistic Minorities in Distance Learning

Abstract

In this article, we present possibilities of supporting Deaf [1] students in distance education through information networks by using Self-Organizing Maps [2]. The use of the Self-Organizing Map (SOM) is approached on the basis of current theories of learning. The cognitive models of learning have often been based on a plain computer metaphor in which learning is viewed as memorizing. Moreover, the phrase computer-aided learning has earlier referred to systems that helped the users in memorizing "facts". We focus on the constructivist point of view taking into consideration human collaboration and problem-based learning. After the theoretical discussion we present how the Self-Organizing Map could be used in a computer supported collaborative learning (CSCL) environment. Hypermedia-based distance education through the information network (like the Internet) provides a significant opportunity to enhance the learning of Deaf students in universities.

Keywords: Cognitive models, Collaboration, Constructive learning, CSCL, Deaf studies, Distance learning, Film studies, Self-Organizing Map, Sign Language, SOM, Memory models.

1 Introduction

We introduce a method for analyzing significant learning patterns among university level Deaf students. Our intention is to make such information more accessible for tutors, curriculum developers and web designers, as well as for students themselves. A general-purpose evaluation tool of a tutor to visualize and manage data of distance learning studies using the Self-Organizing Map (SOM) will be presented in this paper.

This study does not see deafness as a medical deficiency; instead, Sign Language is seen as an interesting cultural, communicational and visual phenomenon [3]. There are about five thousand Deaf people living in Finland and in 2003 only one percent of them were registered as university students. Universities do not provide education in Sign Lanuage (hence Deaf students should be at least bilingual) and "on location" instruction based on lectures and seminars requires using Sign Language interpreters (only a few of the Deaf students prefer writing as the primary interpreting medium). Yet Deaf undergraduates should perform on par with their hearing peers in academic studies and effective collaboration with all persons involved would contribute to graduation. The practical objective of the research was to show the suitability of hypermedia (e.g. WWW service like CinemaSense) and CSCL in the distance learning of Deaf students. Hence our research contributes to the methodology and tools for the inclusion and flexible learning of cultural minorities.

2 Constructivism, problem solving and collaborative learning

In current cognitive learning theory, three core conceptions may be identified [4]. The first concept, constructivism, is the idea that knowledge and cognitive strategies are constructed by the learner, and that learning involves qualitative restructuring and modification of schemata, rather than just the accumulation of new information in memory. The second concept, active epistemology, is closely related

1 "Deaf" with capital "D" refers to "a person born deaf and having learned Sign Language as his or her first language, and who is actively using it". Hence, the concept "Sign Language using Deaf student" is equivalent to "Deaf student" in this paper.

2 Kohonen 2001.

3 Padden & Humphries 1988; Poizner, Klima & Bellugi 1987; Sacks 1989; Lane 1984; Fiske 1990.

4 Lonka, Joram & Bryson 1996.

to constructivism, but refers specifically to beliefs about the learner's role in the learning process. Mental representation is the third core concept. In cognitive learning theory, performance on problem-solving tasks and students' explanations of such tasks are most often accounted for by the nature of their mental representations along with their prior knowledge. Moreover, representations are highly situational [5] and knowledge is socially shared and constructed [6].

3. Action research and co-design project with Deaf students

The action research started in the fall of 1999, overlapping with the production of CinemaSense portal [7], and was made in collaboration with the Class Teacher Education Program of Finnish Sign Language Users in the University of Jyväskylä, where the necessary infrastructure (information technology, Deaf studies, interpreter services, and an authentic Deaf student community) has been established in the 1990's [8].

The distance learning was realized so that the Jyväskylä students took the basic two credits course on cinematic expression as non-registered students in the Department of Film and Television at the University of Art and Design Helsinki. Interactive distance learning and collaboration was mostly done through the FLE3 – Learning Environment developed in the Media Lab of the University of Art and Design Helsinki [9]. A Computer Supported Collaborative Learning (CSCL) tool such as FLE3, a web-based groupware for CSCL, supports collaborative building of knowledge, progressive inquiry and guided inquiry learning. With the SOM, the use of the CSCL tools could potentially be made even more effective (Figure 1).

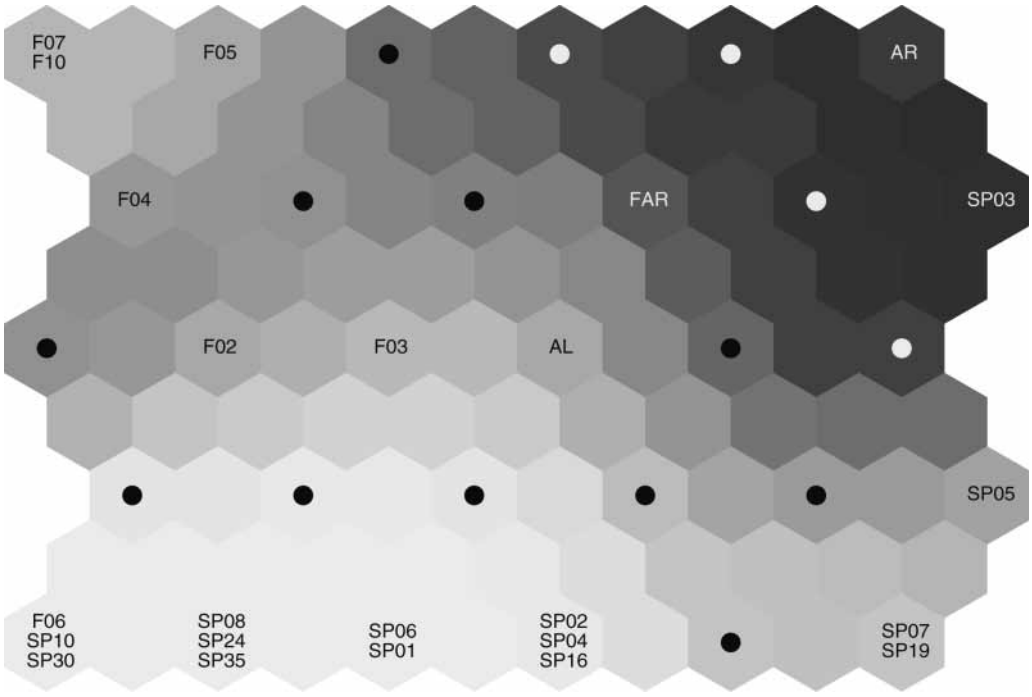

Figure 1. A map of FLE3 and e-mail communication during the action research based on strategies of collaboration.
F=FLE3 message, SP=e-mail, 01–10=students of Jyväskylä; 16–35=students of Helsinki; AR=Tutor, AL=tutor of editing workshop.
Note student SP03 near the tutor and a mixed cluster of Helsinki and Jyväskylä students at the bottom of the map.
The same student (F03) collaborates more in the FLE3 environment.

5 Brown, Collins & Duguid 1989.
6 Honkela, Leinonen, Lonka & Raike 2000.
7 Laitinen, Raike & Viikari 2003.
8 Padden & Humphries 1988; Glaser & Strauss 1971.
9 Leinonen et al. 2003.

The CinemaSense course in the FLE3 had a primary goal to support students to produce a documentary film of one to ten minutes during the research project. The documentary film was supposed to tell about the first school day of the Deaf pupils. Different topics and concepts about cinema were drawn into the discussion. Deaf students noticed during the research that it was a great benefit to the documentary film project if the discussion in the FLE "Knowledge Building" was dynamic and progressive.

4 Self-organizing map as an analysis tool

As a result, we had information in the data corpus of the Deaf students' emails, learning environment discussion messages and concept maps drawn by each student during film study workshops. Beside the corpus, all aspects of the inquiry learning process, i.e. setting up research problems, constructing one's own working theories, searching for new scientific information, can be shared with fellow students by using CSCL shared database. The information-objects, e.g. in the form of notes, can be produced as a dialogue so that each note is commenting and linked to one another. The metadata of each note contains information indicating issues like who is the author, what is the category of inquiry defined by the author, and on which note it is referring to. Different self-organizing maps (SOM) can be generated based on this metadata and the written information in the subject and body of the notes.

The SOM [10] is a widely used artificial neural network model. Finding structures in vast multidimensional data sets like students' e-mail messages is difficult and time-consuming. Kohonen's SOM can be used to aid the exploration: the structures in the data sets are illustrated on map displays where similar items lie close to each other. The SOM learning process is unsupervised: no a priori classifications for the input examples are needed. The learning process is based on similarity comparisons in a continuous space. The result is a system that associates similar inputs close to each other in the two-dimensional grid called the map. The input may be highly complex multi-dimensional numerical data. Recently, the SOM has also been used for the analysis and visualization of symbolic and text data [11].

The self-organizing map can also be considered as a memory model [12]. It is dynamic, associative and consists of elements that can also be called adaptive prototypes. Inputs are not stored as such but comparison is made between the input and the collection of prototypes. The closest prototype of the input is adapted towards the input. The same operation is also conducted for the neighboring prototypes, which gives rise to the topographical order on the map. The SOM could also be used to present study material in a natural way. The approach is particularly well suited for web-based CSCL and distance education, where it can be applied in conjunction with the WEBSOM methodology [13] for analyzing free-format documents, such as concept maps (or mind maps), film scripts, story boards and shot lists.

The teacher or supervisor may create a context by presenting the SOM of the area under consideration. The SOM of the context may present a wider view to the study subject by presenting related subjects and concepts close to the main area interest (Figure 2). The SOMs may indicate which direction students should continue so as to span the whole area under investigation. The students and the tutors may also compare the SOM generated by the experts and the SOMs constructed by the students during the inquiry learning process.

5 CinemaSense 1.0 – web-based study material for distance learning

CinemaSense 1.0 is a web-based study material for film production [14]. The objective of the portal is to help the students to construct knowledge and structural understanding of cinematic expression.

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10 Kohonen 2001.

11 Honkela, Pulkki & Kohonen 1995; Ritter & Kohonen 1989.

12 Honkela, Leinonen, Lonka & Raike 2000.

13 Honkela, Kaski, Lagus & Kohonen 1996; Kaski, Honkela, Lagus & Kohonen 1998; Lagus, Honkela, Kaski & Kohonen 1999.

14 Laitinen, Raike & Viikari 2003.

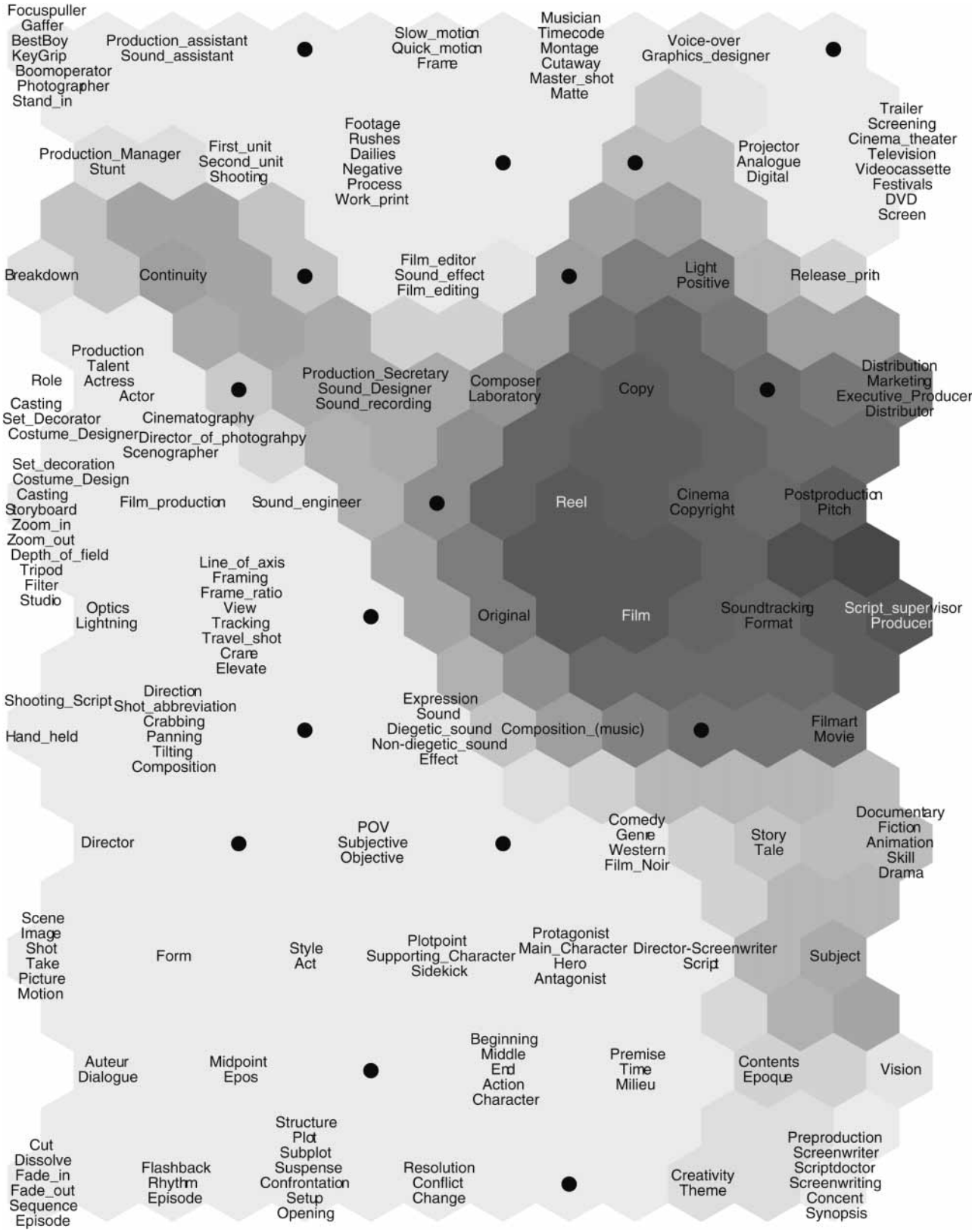

Figure 2. A SOM of cinema concepts based on concept maps of the students.

The product has been developed in parallel with the action research and the students' concept maps and comments were utilized. (For the extensive materials also the SOM was used.)

6 Discussion

The objective of the action research was to improve the Sign Language using Deaf students' understanding of distance learning and to produce adequate tools for effective studies.

First, one can ask how the Deaf students learned the conceptual thinking of the film art and how they created the links between the concepts of cinematic expression. The results suggest that intensive use of hypermedia were relevant tool in learning of the film art, augmenting the theoretical thinking. However, the on location instruction must also be taken into account, as well as the interaction and collaboration between the teachers, tutors, interpreters, and students.

Second it was found, that during the study period a group of Deaf students turned into a Deaf film production team. Novice filmmakers worked virtually in FLE3, and searched for knowledge and material from the web. During the independent periods students collaborated actively especially if they had technical problems. However, it was observed that distance learning required tutoring and "on-location" teaching as well, in one form or another.

Finally, the study revealed that SOM, co-design and action research are effective methods in a design process which contribute to tutoring.

7 Conclusions

It is an auspicious and interesting possibility to provide basic theoretical and practical film studies through an interactive user interface and CSCL with the assistance of a tutor. We suggest that professional designers of the educational products and Deaf students in higher education should collaborate more closely to improve effective learning tools for distance education. We claim that the SOM is a relevant tool in distant learning of film art, augmenting the theoretical thinking of the students and effective tutoring of the group when used with personal concept mapping and intensive use of other web-based learning tools. Future research with practical experiments will show how effective the use of the SOMs will be from the point of view of student learning. They provide promising possibilities for visualizing and making conceptual changes overt. What has already been shown is that the SOM constitutes a useful framework for modeling central concepts of constructive learning.

The final and full report of our action research will be published at the end of the year 2003.

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Women Inclusiveness via Long Distance Design Education

Abstract

Our research field is the isolation of rural women and the consequent effects, on those women's life that can often lead to a kind of "disability". Women's lack of opportunities and unemployment are still serious drawbacks in many areas in Greece. It is a social phenomenon effectively present that results to their exclusion from society, economical extortion, and thus, to their "disability" in the broadest sense. The majority of rural women declare as their occupation "farmers", which actually means "unemployed", since it is an occupation that does not offer them any personal income, regardless of the efforts and labor involved, and statistically it means a rate of 15% unemployment per year for the female rural population of Greece. Many rural women wish to work, or work locally in the production of handicraft items without having any design or production education, and only a minimal basic education, parameters that often result to their further exclusiveness.

The rural locations of craft production in Greece, the different cultural backgrounds and the low educational level have resulted in a low level of professionalism of these women. Lack of know-how in the development of new products and designs, of innovation in product design, of aesthetics and knowledge of the true tradition and heritage, of new technological developments, and the possibilities of reconciliation of the hand-made quality with the new technology, are the main problems of the rural female population that is involved in craft production.

Our research work and case study is facing the problem and is seeking solutions via design education, via training and via promoting the home and cooperative industry and production. It is part of the combined project "CRAFT", a Community program, executed via the "Leonardo Da Vinci" activities and it includes Greece, Italy, Ireland and Sweden. The proposal applies to all partners' problems on women unemployment and isolation and does not have a limited Greek application only.

Craft

"CRAFT" (CRaft Adaptation to Fast-changing Technology) is a Community initiative that promotes the adoption of new strategies in the development of initial and continuous vocational training. It aims to support unemployed women in handicrafts, enterprises and small businesses in the arts and crafts and design sector to adapt to new technologies and become more competitive in the European market. In addition, CRAFT aims to provide distance-learning program to women that live in remote areas, to assists them to combat their isolation and exclusion and to improve their efficiency. An important issue was the provision of jobs for women in rural remote areas.

A special distance learning training package was created in Greek, English, Italian and Swedish, for women handicraft producers, with training modules on design (colour, design and applications) that would meet their skill needs, regardless of location, language, and operational and cultural differences. Since it is of the utmost importance to them to be able to run a modern business, we offered them also training modules on entrepreneurship (management, accounting, production, and marketing) and technology (computer usage). The unique feature of this project and the case study is that it provides the opportunity for European rural women to explore craft design and production issues from their home base, enabling effective sourcing of design information.

The greek case study

The module is based on research, which is carried out following the application of a formula that sought to investigate the needs for art-education and training in new technologies among eleven women handicraft cooperatives in rural, isolated and remote areas of Greece. We consider them to be of great importance, because they play a special role in the continuation of Hellenic design identity.

Our study was based on the following steps: Research work among women craft producers and craft cooperatives; Evaluation of the findings; Research

on distance learning; Development of distance learning design education and design methodology module; Establishment of the long distance training package.

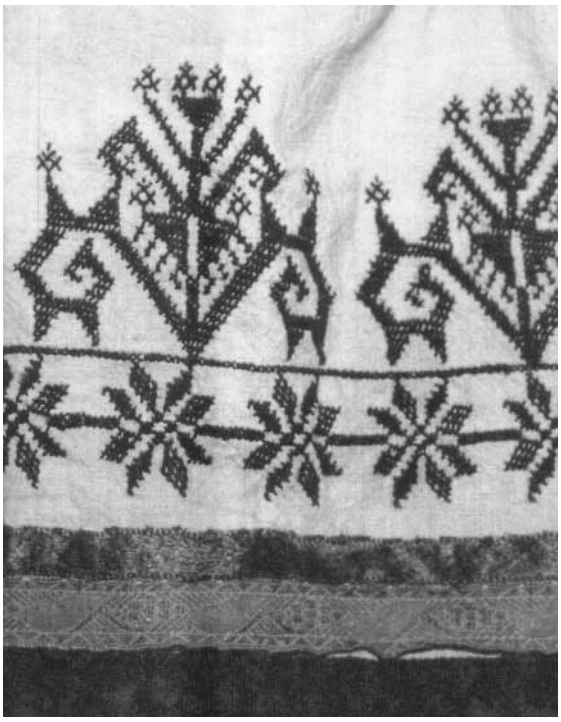
The steps in our work consisted of two years of investigation into the workings of the craft production industry and women art-craft workers in rural areas, with parallel study of the local history of traditional design, one year for the completion of the case study and the long distance learning module, and during the fourth year local and European dissemination with a parallel application of the project in our academic curriculum. The local dissemination was actually an opportunity to view the total design and production work from the rural women that participated in our case study.

The research team was composed of the staff members of the TEI's Textile Design Workshop and degree students, with their final degree work and practical training. The degree students undertook research on handicraft women throughout Greece, investigating the traditional design and heritage, the ways of production and the possibilities for innovative uses of the traditional media and designs.

The following actions were taken, in relation to the projects: Presentation of previous works via CD-ROMS, Internet and hard copies; Creation of a mini database; Meetings to outline the main activities; Produce frameworks of tasks; Source and find information related to women handicraft producers; Produce questionnaires for the research; Presentation and evaluation of all the outcomes; Formation of a database on Greek women handicraft traditional cooperatives; Analysis of the women handicraft producers' design and marketing problems; Questionnaires for the interviews.

Information was provided by the Greek Organization of Small and Medium Sized Enterprises, (EOMMEX),

Image 1.



the Hellenic Association of Handicraft Cooperatives (HAHC), local Museums, commercial and industrial chambers, affiliations and cooperative organizations, treated as resource centres.

Women handicraft producers in Greece

Handicraft producers fall basically into two groups, professional producers earning their living from sales, and those who produce hand-made items, in addition with another occupation and are mainly women. The first group is open to new developments, while the second group is related to the retention of local and regional traditions. The majority of Greek handicraft cooperatives, and especially textile handicraft cooperatives, draw their members exclusively from among rural women.

Research has shown that there are many factors responsible for the exclusiveness and isolation of women handicraft producers, as has been described. Lack of essential skills, mostly regarding design, management and marketing, proved to be a common feature in all handicraft operations. External support from experts could be a prompt and effective way to remedy such deficiencies and the support of private consultants could also be valuable for the introduction of information technology and the use of multimedia in the design process, but appears to be generally financially prohibitive. Their location away from urban centres, in remote rural areas, makes it even more difficult. It is also important for all women craft producers to obtain basic awareness of the existence of new information technology. Most women are working with the traditional designs and means of production. The economic and operational structure of the handicrafts industry in Greece, combined with the demands of the tourism market for tradition, does not allow them radical interventions.

Image 2.

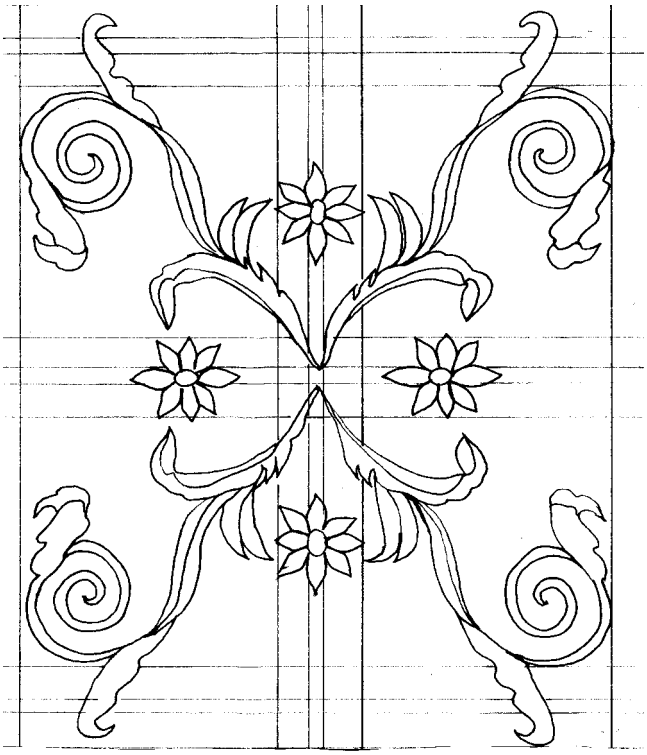


Image 3.

Long distance learning

Our module established a distance-learning database for the common use of all women handicrafts of the four countries involved. The vital reasons to move from traditional teaching or training processes towards distance learning were the location of the participants and their educational differences.

Nowadays most learning is resource-based learning and is succeeded "independently". Historically, the most important kinds of learning resources were paper-based, particularly books. Nowadays, the range of media available to support learning is extended by many technological developments, and learning resources have forms, including human resources and information-type resources.

Investigating on how people learn, leaded us towards four primary processes being involved, in an overlapping way: *Wanting to learn*, it is important to have motivation (want) to learn. *Learning by doing*, independent learning depends on learning by doing; practice will help learning to be successful. *Learning from feedback* (other people's knowledge); learning resource materials need to be sufficiently attractive and sufficiently interesting. *Digesting* (making sense of what has been learned); learning resources take many forms, including information-type resources, that is on-line databanks and learning packages, which are the learning media adopted by CRAFT.

The module

The training package was created and offered to the pilot women craft producers via CD-ROMs and the Internet, enabling the transfer of design and marketing know-how, of information and experiences and where design has been traditionally articulated in print, it is now accessible via the Web. *Our*

Image 4.

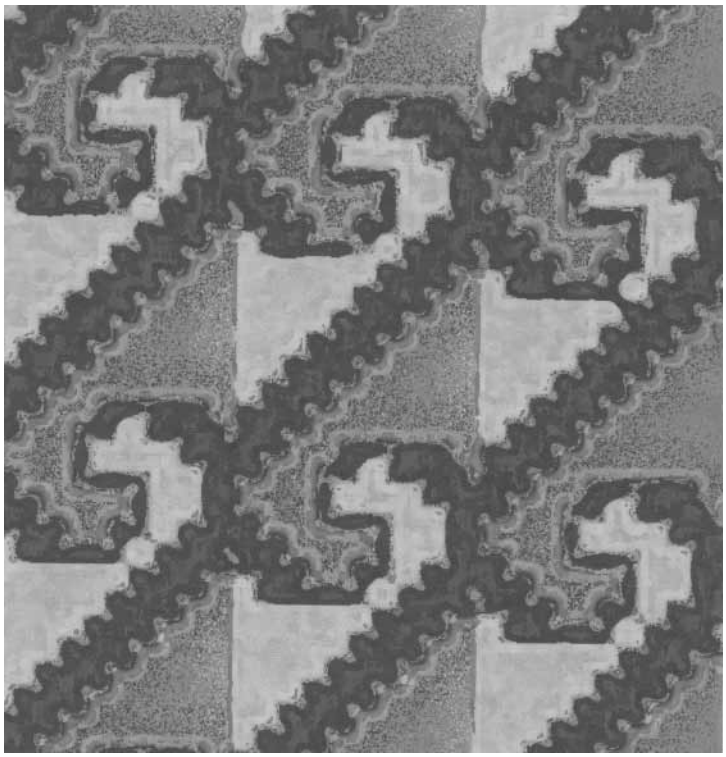


Image 5.

web site provides them with the opportunity to: Obtain access to training and develop the skills necessary to become completive; Draw them from their economical isolation; Succeed inclusiveness in our modern world. Additionally it promotes equality of opportunity for women workers, offers a suitable forum for the creation of networks for cooperation and utilization of synergies and supports rural women producers to communicate, since if isolated, might be neglected or not utilized in terms of their advantages.

The design module helps them to visualize evolutional, innovative design possibilities of well known and overworked designs, opens up their minds in designing, in new technologies and possibilities, without forcing specific designs and applications on them. *Example* of our design module are the hereby images. Image 1 presents a well known traditional "Sarakatsanes" female costume. From its woven decorations we proposed a variety of possible approaches to new surface and textile designs, Images 2–6. All designs are developed according to the proposed and analysed in our module design methodology and with a presentation of possible use, Image 7. Many similar analytical examples are included in our Web site.

Linking up with CRAFT site all interested women can find ways for: Development of new products and designs; Innovation in product design; Aesthetics and knowledge of the true tradition and heritage; Awareness of new technology; Basic awareness of marketing; Basic awareness of management; New Opportunities – Visions – Skills – Technologies – Directions; New Digital/Media Environments.

Image 6.

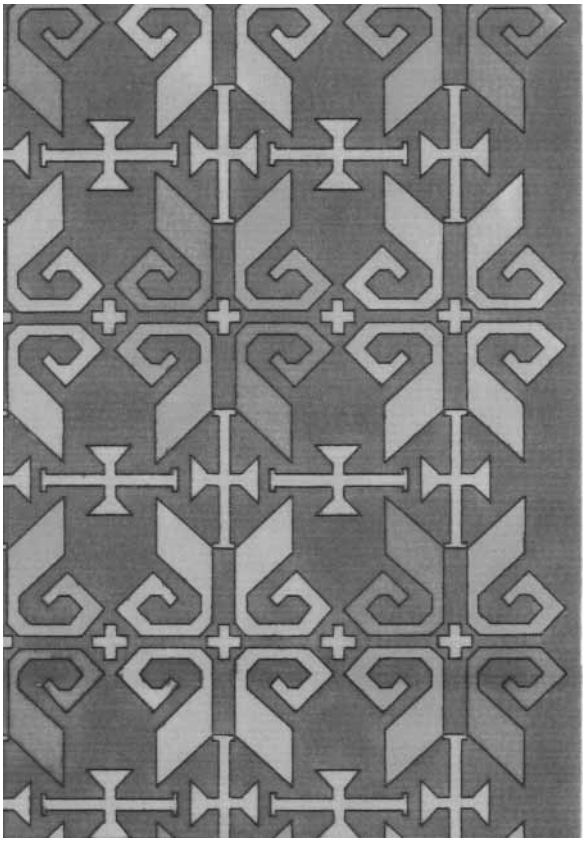
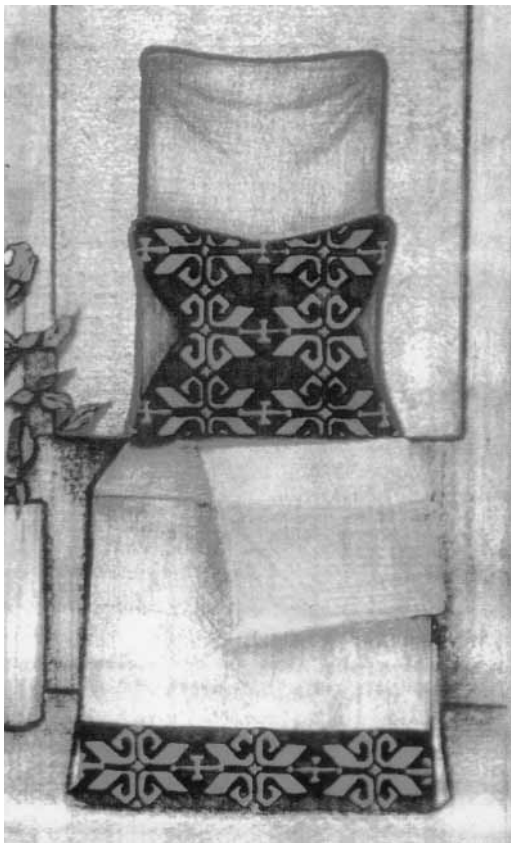


Image 7.



Results

During the years 1998–2001 approximately sixty-eight women attended our special CRAFT seminars for the application of the package, and approximately 500 full and part time craft producers have been benefited from the program. In times of global networking, increasing competition, persisting unresolved economic problems, women handicraft producers must endeavour, more than ever before, to link their tasks to wider objectives, if they wish to escape from exclusives and disability and to obtain the inclusiveness they deserve.

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Interactive Multimedia Design and Visually Impaired People

Abstract

This article reports on an exploratory academic study, undertaken in context of a PhD research project. The study offers insight into key issues of an integrated, interactive and creative design process that aims to develop a multimedia computer application for visual impaired people (VIP), utilizing a selected social environment. A Product Planning Framework has been developed to assist in the practical design process (product planning and design) for enhancing the quality of life of VIP, by increasing their independence in leisure and education with the use of Computer Technology.

The selected environment is a public transportation area that is reviewed with regard to potential distressing and socially isolating aspects for the visually impaired visitors. A computer-based application will be designed to prepare and inform visually impaired users how to approach the idea of being in an airport (move around-exploring, know how to book and use the ticket etc.), and generally what to expect when visiting an airport. The project will be tested during its development involving active participation of VIP in the design process.

Introduction

In the arena of HCI, the issue of care for the VIP is still in its infancy. Although several related studies have been published they do not address design issues. In researching, such a new subject area [interactive multimedia design and VIP] related to design practice, I developed an understanding of design research applying an exploratory and synthetic rigor necessary for this study. The importance of providing an "independent life" is emphasised to meet description of the European Commission DGXIII (n.d.) "persons with a disability take control over their lives, access the same opportunities and face the same choices in every-day life that non-disable persons take for granted". [1]

The initial idea for generating this research project was the belief that visual communication (graphic design) can work complimentary to computer technologies and vice-versa. As a qualified graphic designer I have been influenced by Itten's theories focussing on form and colour and the process developing the colour circle. His books "Rational of Colour" (revised edition, 1997), "The Colour Star" (1997), "The Elements of Colour: A Treatise on the Colour System of Johannes Itten Based on His Book the Art of Colour" (1985), initiated my design case study. His theory of contrast been developed on the main theme "glare / obscure contrast", treated in the form of checker-board patterns burst the concept of this project. The purpose of the study is to argue that software design could benefit from other more traditional design disciplines [2]. linking two main subject areas: graphic design and information technology both in the domain of 'interaction design'. The aim is to extract graphic design and information technology possibilities to the benefit of VIP. The project describes a new approach to image enhancement for people with visual impairments enable them to familiarize with an airport environment and thus facilitating their mobility in it. After all getting prepared for a task usually leads to a more successful outcome than executing a task without a plan specially if this task is a potential traversing of an unknown area. The information is given in an artistic layout taking into consideration all key issues on visual communication. The application informs the user of what he will find in an airport and therefore encourages him to visit the area with more confidence and joy.

The study is concerned with the interaction between VIP and multimedia and its goal is to explore the potential of interactive multimedia design in improving the relationship between VIP and

[1] European Commission DGXIII (n.d.) , (n.d.) cited in Williamson, K. et al. 2001.
[2] Winograd et al. 1996

computer software. Thus, a specific plan of structured activities ascertain the design research proceedings with objective to achieve the predefined goal. The user-based collaborative model of the interaction between multimedia and VIP will be carried out through a computer-based design solution utilizing the airport as the location for the application.

According to Gregory [3] disability is not just about being different, but about how the difference is evaluated. Gregory goes on claiming that "disability, rather than being a biological given, can only be understood within particular social and cultural frameworks". Totally agreeing with the above quotation I decided to implement the testing and evaluating of the user-based collaborative model with two target groups one coming from UK (Queen Alexandra College for the blind in Birmingham) and the other one from Greece (the Light House). The choice of case studies from different countries reflects a concern to introduce different cultural facets to the investigation. The users are chosen in order to represent differences in age, sex, education, visual impairment, and computer experience. As a graphic designer I based my case study in answering all "whys" raised during the design process of the software application, while all "hows" are explored during the developing process through thinking about design from a broader perspective, and exploring how knowledge from all areas of design and computer engineering can be applied to software design.

Going through this case study it became evident right from the early stages of the design process that just my graphic design training proved to be not enough for implementing my final goal been – the design and development of an interactive multimedia computer application for people with visual impairments. An insight into the information technology field proved to be necessary from the very early stages of the case study. Beyond any doubt there is no logical reason why the skills of artist-designer and engineer-designer cannot be combined in one person working simultaneously the design and engineering of the interface.

Aims and goals of the study

The aims of the project are:

1. To identify problems faced by VIP in selected social environments, and examine how visual screen based computer technology is involved in their every day life.
2. To bring into focus which demands and principles in general are necessary to make the ergonomic part of a multimedia product accessible for VIP.
3. To identify the potential role of multimedia for people with visual impairments.
4. To design and test a user-based collaborative model, of the interaction between multimedia and VIP in areas of public transportation, and to develop visual design based solutions.
5. To study the interaction between VIP and specific adaptive technologies and conclude with a design-based solution.

The case study is aiming through highlighting navigation problems to propose solutions, which could solve them. It is also aimed to highlight the effect of usability on product preference, the use of models, visualisations, and prototypes in interaction design, and the affect of graphic design on usability of software applications.

Developments / Case studies

People with visual impairments spend a great deal of time and energy trying to learn how to be mobile and how to cope in a hazardous environment. Although the visually impaired may become very good at using their other senses to the full, this does not compensate for their lack of sight. The case study explores analyses and evaluates step by step navigating activities that must be highlighted on the computer screen so that can be viewed and identified in order to facilitate the performance of VIP while visiting an airport. The objective is to allow the individual to quickly and accurately perceive the environment and be informed on position, direction, desired location, diversity of activities etc.

According to Dodds [4] the environment is best

[3] Gregory 1997.
[4] Dodds 1993.

thought of as an arrangement of surfaces one lying in a horizontal plane, and the other two lying at some angle in relation to one another in the vertical plane. In "mobility", the task of the traveller is to maintain contact with the horizontal surface while avoiding contact with the vertical ones. Consequently, one can conclude that the design of a user-friendly computer application with user-centred interface, designed in aesthetic and usability context, can increase confidence for locomotion of VIP, within complex build environment, while movement in it depends upon the ability to obtain the visual information necessary for facilitating orientation of potential users. Mobility, orientation and ability are three elements that combined enable humans to accomplish many different physical or mental goals. These elements can provide navigation in complex environments. Vision facilitates mobility and orientation, while ability is facilitated by physical integrity.

Unlike sighted people, VIP cannot familiarise themselves with the environment through simple observation. It is a slow and time-consuming process. One can say that navigating into the urban environment is an effortless procedure. However, when one finds oneself in a foreign environment, the procedure becomes anxious and sometimes distressing. To overcome such situations, one needs to mobilise the "ability" and "mobility" to accurately orientated and navigate. In the case of VIP, this is something they need to do whether the environment is familiar to them or not although many have stated that they could normally only travel unassisted in areas that were familiar [5].

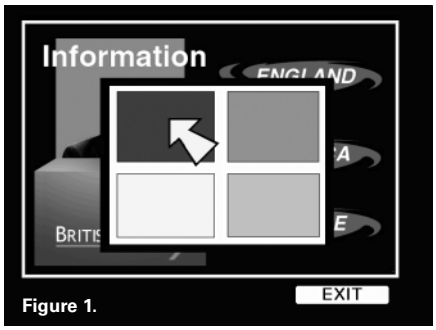


Figure 1.

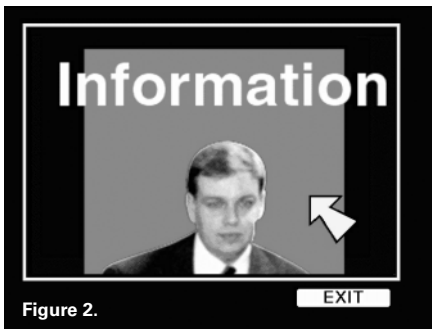
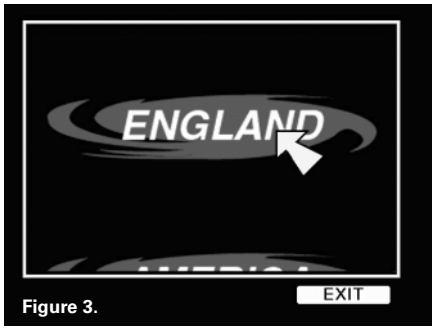


Figure 2.



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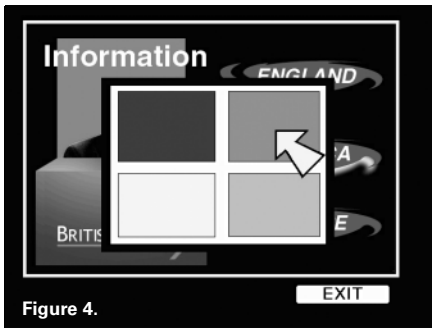

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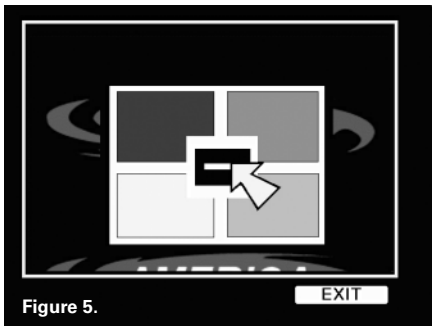


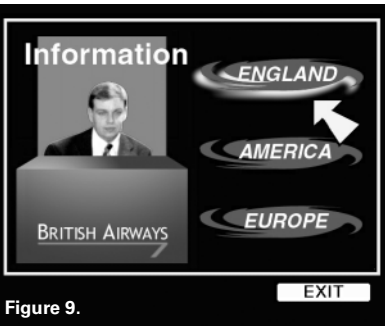
Figure 5.

[5] Jansson 1984; Brambring 1984.

Figure 6.

Figure 7.

Figure 8.



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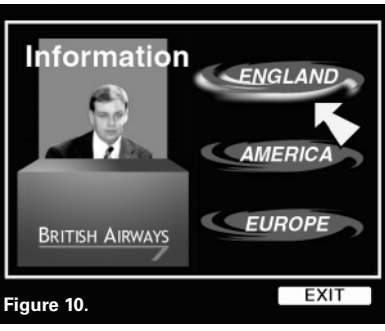

Figure 10.

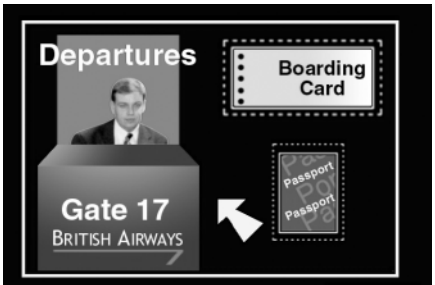

Figure 11.

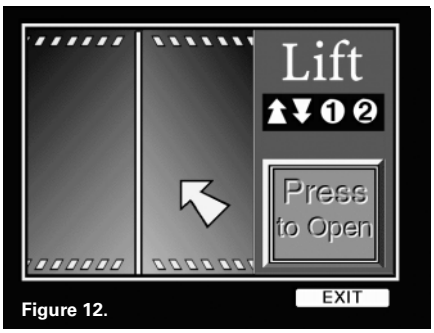

Figure 12.

Figure 13.

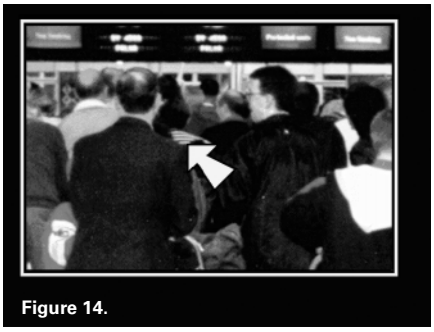

Figure 14.

Figure 15.

Case study 1

Representing the airport on the screen I tried to create a 3dD atmosphere for the visually impaired user, combining sound, images and graphics. A realistic representation of air terminal – entrance, arrival, departures, people queuing for check-in, control areas etc. – appear in the computer screen so that my user can safely and with confidence explore (see Figures 6, 7). Images are combined with real sounds that facilitate even more their navigation to check-in-desks, ticket-desks, check-in-points, lifts, restaurants, cafes etc. At the same time, they can go through the whole process of purchasing tickets (see Figures 9–11) use them to pass the check-in-point, reach the boarding gate and use the boarding card to get to the plane. Combining sound and screen images with highlighted areas to click on, I am making sequences, where the user interacts with the computer. The feedback that the user gets from the interactivity it reaches the limits of reality meaning that the user is guided to follow the correct sequence of activities. Through participatory design (group of visually impaired students at Queen Alexandra College of Birmingham England and ongoing progress of work with group of VIP in Light House of Athens) User-centred design decisions were taken resulting in a more informative and well accessed design solutions.

The USERfit methodology directed the questions that need to be answered and focused on the importance of taking user requirements into account in the product development cycle (suitable in colour and size mouse pointer, contrast and brightness of specific colours, colours of control panels, graphics on the lifts well designed and reasonably portioned – see Figures 12, 13). For generating my users self-confidence and their full participation with the programme all graphics of the interface are designed to fulfill the needs of visually impaired users. On the other hand "real world" sounds work as a navigating tool to the user of the system (Figures 14, 15) increasing the use of hearing so that movement is centred on getting to a point and not moving along an edge [6] and also guiding the user into the screen [say from left to right, top to bottom]. Using stereo sound output a 3d atmosphere is created while following directional sounds user is guided to desired points. Using screen images in combination with sound manipulation a navigation tool is developed since approaching a certain part of the screen area, the sound gets louder and the picture blows up like using a magnified glass. Moreover, certain sounds give information without even providing the user with an image. Sound samples, just enough to identify the visiting area, is the vehicle to my navigation tool.

Case study 2
– the "Navigation colour palette"

The general idea of the navigation colour palette is to divide the screen into 4 equally parts. These parts have their own colour. Each colour part indicates the part of the screen it's occupy (Figure 1). When clicking on the blue area the upper left of the screen will be magnified 3 times (see Figures 1–2). If you click again you get 6 times magnification and a number notify you the times your screen is been magnified (Figure 2). There is also a black rectangle in the middle of the colour palette that brings you back to the previous magnified condition of your screen. When the zoom exceeds the 3 times magnification a black circle button appears which when you click on it you go back to the initial screen without the magnification module (Figure 3). The navigation colour palette provides the solution of the "way finding problem" in which a visually impaired computer user feels lost and not oriented in a magnified monitor display. Adaptive technology provides solution to the visually impaired computer users with software and hardware applications such as "Screen enlargers and screen readers". These solutions enables the computer users with low vision to access industry standard systems with ease. The screen enlarger allows the user to enlarge a portion of the screen. The problem with these solutions is that the user tends to get lost in the big screen. "I find my self in a very difficult position when I want to use word processing programmes". These are words of a visually impaired computer user with low vision using 10 times magnification in a scale of 2 to 16 times. She always position the mouse to the upper left hand side of the screen and starts coming down.

—

[6] Jansson 1984.

The problem starts to rise when she is in the middle of the page, or at least that's where she thinks she is. There in no way to know where exactly you are on screen. The navigation colour palette helps navigating your self in a huge magnified monitor display area, knowing every time exactly your position. It is the solution to above-mentioned problems and a secure and productive way for users saving their time and offering them confidence and joy.

Expected results of the project

Expected direct results are:

– an extensive report on difficulties encountered by VIP when visiting an airport.

– a report with Technical Specifications for software aiming at facilitating visits of VIP to an airport.

– an application that will educate and inform VIP that would like to visit an airport.

Indirect results:

– the increase of effectiveness, creativity and sense of independence of the VIP who feel at least awkward visiting public transportation areas such as airports which, in continuation will

– build up their self-confidence and self-esteem.

Besides the final target group being the VIP value added is also created for the authorities, since the integration of visually impaired or any other minority group means less cost for authorities. People that are integrated are happier and therefore less often ill. Independence of family members, help-organisations and friends eventually costs less (morally and financially) of all people concerned.

Conclusions

In today's world of computer applications, the vast majority of applications present themselves to users in a standard way – a visual display with a key-board and pointing device. But increasing development of computing technologies it is focusing in bring richer resources to physical human-computer interactions. Locating and accessing electronic material has become a common feature of academic, commercial, and leisure activities. Thus, designing for the full range of human experience may well be the theme for the next generation of discourse about software design. Through this research study, efforts to define and promote new visions of software design have been placed. As a graphic designer I have eagerly and actively been engaged in a challenging dialog between Human-computer Interaction, Software design, User Interface design and Software engineering.

Potential design solutions can be extended to other public transportation services, making this project a vehicle for inclusive design solutions to a virtual or real environment, accessible to all – Design for all – in context.

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‘Beyond the Garden Ecodesign 2002 Riccione’ – Ecology Beyond the Cultures

Background

European Commission has supported some international design projects within the programme “Culture 2000”. One of those is an Italy-driven initiative to bring eco-design to the tourist context of the Adriatic coast, named “Beyond the Garden – Oltre il giardino”.

Emilia-Romagna Region, city administrations and the business of tourism have called design students from Rovaniemi and Florence to make a paradox possible. The need to improve sustainable tourism within the experience industry of the coastline is strong and the idea to call design students to plan sustainable and eco-compatible street furniture has been approved as one of the most interesting projects within the culture programme of last year. The case “Beyond the Garden” is a very fresh and joyful example of the possibilities young designers can have in a broader European context. Students from Tuscany and Lapland have been working for the same subject from March 2002 to July at their home universities. Then they have realised their ideas with the local aid creating an open-air exhibition on the central streets of Riccione for whole summer.

One of the main purposes of the project was to make tourists more sensible towards the city environment and its ecosystem.

Sustainable street furniture for tourists

The small town of Riccione is called “The green pearl of the Adriatic” because of its serious efforts in keeping the water clean and the environment in balance. Ecological catastrophes have already been fatal for the local business of leisure: no hotelkeeper or restaurant owner can forget the nightmare of pollution by mucilaginous masses in the Adriatic sea in the summer of 1989.

At the Adriatic coast every element is submitted to the maritime climate, saltiness, wind moisture and scorching sun.

Another stressing factor is due to high number of tourists during the summer period. In Riccione there are only 24 000 inhabitants, but 1 million tourist presences during each month of high season.

Environmental awareness among these masses should be one of our goals, but without preaching or raising guilt feelings – they are on holiday.

How Finnish students from the Arctic Circle can bring better solutions to the context they have never seen? Which are the methods and thesis of "eco-design" applied to achieve the very happy results?

Fortunately the phenomenon of mass-tourism is familiar to everybody: all students have an idea of a summer holiday on sunny shores. Our initial approach was based above all on the study of the place and its identity (*genius loci*) and on street furniture and tourists' needs (*homo ludens*). The theme agreed upon with the ISIA of Florence was perceived as an approach beyond the eco-romanticism and conventional concepts of street furniture. The ecological dimension of the project had to go beyond the recycling, because unfortunately the term eco-design is often restricted to the concept of recycling and understood only as a material action.

The briefing of the very complex task had to be made mainly showing video material, photographs, tourist folders and postcards. The course leader visited Riccione one morning in February and once in April to get all the information directly from the tourism councilor, representative of hotel association, the owner of the trendiest bar of the beach and the regional administrations. As well the city council staff from directors to street cleaners were consulted. It has to be said: this kind of interviews and data collecting was only possible by speaking Italian, reading Italian and knowing the Italians. The international project was not led in English – and we are speaking about tourism! The answers to the queries by students on local trash or consumptions were not available in internet, if not in Italian. No problem, the teacher will translate and interpret after having done the photographical services.

The analysis of tourists' needs in an urban context during a hot summer holiday helped to point out the services that could be offered by street furniture. The need of refreshment, shadow, rest, socialization, information, orientation and safety along with the summer dreams could be named as the main context-based needs.

◁◁ **Figure 1.**
Ulla Niemelä and Milla Haarakoski showing the "Venus" photo bathing hut created in Riccione for summer amusement.

▷ **Figure 2.**
"Pick the Block" – a bench to play with created by Milla Haarakoski. The maritime animals can become strange mutations by moving the cubes.

Figure 3.
Lasse Kovanen and "Green Lounge" for fresh urban picnics, made of "restaurant mosaic".

The needs of the city council, instead, were e.g. the educational litter bins showing how to differentiate soft-drink cans from plastic water bottles along the pedestrian streets. The tourist councilor wished to promote the use of the public beaches during the nights.

Her special interest is the promotional value of the project that can show the eco-friendliness of the city in a fresh new way – as well as confirm Riccione's trendsetter position. The regional director of park maintenance would like to see less casual choices in local street furniture. We have to admit, that Riccione has a unique style in combining anything and every thing: paving recalling Ipanema, ten different types of litter bins on one square, fancy Florida-like elements (like the central *Perla verde fountain*) and surprising flower boxes on trees. Everybody knows Riccione as a kind of amusement park, you go there for fun: sunbathing, shopping, nightlife and seashore sports.

Sunny design for happiness and joy

My course choice at the University of Lapland has been to follow the spirit of Riccione and its look of light-hearted holiday, inviting people to discover simple and elementary joys creating elements tuned within local aesthetics, and, playing with the local icons such as the *Perla verde / Green pearl* symbol. Keeping an eye on local manners as well.

But, what is sustainable design? Here we are proceeding from the tourists' needs and the identity of the city towards our task to apply "eco-design" principles. Basically, design for need is sustainable when corresponding to local aesthetics and when it is intelligent enough to create discoveries. Another point of view on sustainable design could be to make people happier, so that they take care of their environment and do not destroy the surrounding objects (a problem with public spaces we have to consider and remember).

One way to apply eco-design thesis to this street furniture challenge is to use the city environment as a scene for different applications of eco-examples. This could be called educational design in environment.

The following principles were applied when selecting the ideas that could be best for Riccione and its own eco-compatible street furniture for tourists:

1. All-around understandability and usability.
Tourists coming from different cultures cannot understand e.g. the local waste management system if it's not very clearly designed. Lots of mistakes could be avoided preventing them by good public design. You

shouldn't need instructions for use to understand the objects on the streets.

2. Alternative forms of energy.
The power of solar energy abundant at the coastline can be harnessed to street lighting. *"Solar Cell Shadow/Lamp"* should function as a beach umbrella during the day, collecting energy with its photovoltaic elements to provide light during the evening. It is like a flower that opens and closes according to natural light phases. It is possible to show how *human energy/ man power* can be harnessed to avoid batteries.

The energy to do fitness exercises can produce power for something. The eco-disco created for the beach parties (nightlife on the beach to be promoted) is working with a "music bike" called *"La ri-cicletta Vigor"* (*Caeruleus cantus*). This old recycled bike has a radio inside working with dynamo when DJ is cycling.

3. Almost immaterial products.
We have created some objects by "packing the local nature", like the sand of the beach as filling of the seats for beach parties. The broken inflatable beach toys (not able to contain air anymore) have been taken to a new life cycle by filling them with sand, like "Sacco" chairs. Aesthetically these *"Metamorphosis"* (*Mutare forma*) beach-cushions are a natural part of the landscape. This project belongs to the eco-disco.

4. The use of local materials.
Local materials don't need to be transported around the world (using fuel, stressing environment). Many times the local materials are resisting better for the climate and time, getting even more beautiful with years passing. The local colors and landscape are in harmony: the man made object seems to be a natural part of the environment. But which are the typical materials at the Adriatic coast? In order to apply the GENIUS LOCI principle, we thought about the nearby town, Faenza (famous for its ceramic, faience) and Ravenna (renowned for its mosaics). The very material of Riccione could be the waste material of restaurants and hotels, such as broken plates and cups. *"Green Lounge"* (*Non est bonum esse hobinem solum*) is an invitation to an urban picnic on "removable"

Figure 4.
"Ecodiscoteca" with re-cycle Ricicletta Vigor to make battery-free music on the beach.

Figure 5.
The Mayor of Riccione Daniele Imola sitting on his favourite "species" of arctic street furniture "Soul chair" with Mari Korhonen.

grass with an attractive white frame made of pieces of "restaurant mosaic".

5. The very visible (and ornamental) use of local "life-style waste".

The trendiest aperitif of summer 2002 was champagne in a micro bottle, complete with drinking straw. During one season, over 30 000 bottles may be consumed in a single bar. Differentiated glass waste collection is not an ecological solution for the problem of massive quantities of bottled drinks. The still perfectly preserved bottles should be picked up and re-used as containers for liquids, but they are not. *"Bottoms up!"* (*Assidere basis vinarius*) look like precious gems, real urban jewellery, made of "rejected" material. The bottoms and mouthpieces of green glass bottles are mounted on a cement base, creating shiny dotted seats. This is an example inspired by the "Green pearl" theme, a tribute to the image of Riccione. The sitting room comes complete with hand-operated fans, *"Feel Cool"* (*Flator volvi*), for cool relief from the holiday heat. *"Soul Chairs"* (*Animus a humus*) are comparing nature and artificial showing clearly what they are made of. One seems to grow from the grass and it is the nature to adopt the artificial form of an armchair while the other chair is filled with plastic bottles (or other holiday consumption waste like tubes of suntan cream) – you can ask which of the chairs is more ecological.

6. Multifunctional and multipurpose elements, services.

Many of the street furniture ideas realized during the workshop were adapted to urban playing, holiday amusements. The HOMO LUDENS principle has been studied for typical summer holiday activities. The tourist metaphor par excellence is surely the postcard. *"Nature Window"* (*Fenestra natura*) is an official frame for the best view to be photographed, like a do-it-yourself postcard, souvenir from Riccione. The same element is a comfortable seat where you can wait for your friends, play kiosk or television. *"Venus"* photo bathing hut is evoking to the birds' nests distributed by the city council of Riccione to the public parks (their biological prevention against insects). The image of the birth of Venus by Botticelli recalls the local green pearl and shell symbolism. *"Pick the Block"* (*Nascetur ridiculus animalus*) is a mix between a game and a bench. The hollow cubes can be turned around a wooden track to form mutant maritime animals or other modular images. The animal mutations are a signal of an unbalanced ecosystem. You can move a cube as well from sun towards shadow. *"La perla verde lotto"* (*Caeruleus pilafortuna*) near the central bus station is a tribute to Italian people who see numbers in their dreams and like gambling them. It can be a holiday play for tourists who are not sure where to go in Riccione and which bus to take, ready to new adventures by

sorting their (bus) numbers of fortune (green pearls, naturally). *"Natural Cubes"* (*Pyus pyxidis natura*) show the force of nature and the life. The cubes growing refreshing plants are above all for sitting, but the figure of "cubist" (the podium-dancer of the Emilia-Romagna coast discos) inspired us to make a city platform for everybody who wants to perform in public.

7. Beautifully ageing design.
Here we can consider as well all the natural elements: green, plants and refreshing trees. In environmental design the harmony and the feel of well-being, with the signs of time and life (like growth and blossoming) are vital for all of us, people as well as for animals.

Since all these objects had to be installed along the central streets of the city (where people can really use them) a common branding of the exhibition was needed. The Lapland University design theme was a "botanical garden showing the arrival of new species of arctic street furniture to the Adriatic coast". Every single "species" has its Latin name and its pseudo-scientific description on characteristics, natural habitat and benefits. The same was shown at the exhibition inside the Tourism Palace of Riccione through a collection of giant postcards showing the "new sights" of Riccione.

Conclusions: the 5th e is for enthusiasm

The survey on holiday happiness and tourists' needs was not a bad idea. The joyful approach by playing with the local identity and image was successful, because the very fresh ideas came out by laughing and smiling; criss-crossing topics and finding out new attractions. This enthusiasm can be seen through work results: you cannot design or communicate happiness or joy without feeling it. You easily transmit to your work the mood you have in doing it. A good team spirit is another important factor when working for a common goal. Excellent individual design skills are requested, but if the single students are not playing well together, the final outcome can be less meaningful. Within the project "Beyond the Garden / Oltre il giardino" the northern students were capable to surprise all the organisers already in May (before any substantial work) with the selection of design concepts and their descriptions. The eco-management office of Riccione was almost ready to order new "Rovaniemi litter bins" to their town, they were so convinced about students' skills. After an Italian ten days workshop in July with a feeling of great enthusiasm among all participants and organisers, local politicians and trade association, everybody was convinced: this experience has to be done again!

Emilia-Romagna Region is firmly looking forward to repeating this kind of alternative experience in local tourism promotion. Maybe some of the Cumulus schools will be interested to try these Italian public design lessons?

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Figure 6.
"Jere was here" project: Jere Määttä chooses the most important views of Riccione to be framed with his multifunctional seat-frame-kiosk element.

Landscapes Forbidden – and Found

Introduction

Landscape School is an experimental course at the Dept. of Architecture and City Planning of Estonian Academy of Arts. It explores landcapes that are strongly influented by human actions. This study goes parallelly with urbanism which explores densely settled areas.

Landscape School is running third year. It is stressed on work in open air. The intention is a cognitive process, to get the "real touch" with the material. The result of the workshop is 1:1 scale installation in open air, which is a visual expression for a local problem and its solution. The installation has to be sensitive towards the environment and strongly intrusive at the same time.

Last two years the topic of landscape architecture workshops has been dealing with industrial landscapes. It means studing these Estonian landscapes, which are discarded by other landscape researchers as disagreeable and nondescript regions. So we have chosen non-romantic industrial landscapes and urban surroundings, which we consider more interesting and freshfull.

Spatial features together with local interest and initiative are principles of selecting places for workshop. Collaboration during workshops like this gives opportunity to work with more people. That helps to organise also larger scale happenings.

Industrial complexes together with artificial landscape forms and settlements are signs of certain period. They are parts of the cultural landscape that need protection and development at the same time. Factories which have closed the production process have stored up many new ways for exploitation, potential to become needful through new creative uses. In that way they will stimulate development of the whole region.

The main ideas of creating industrial parks in West-Europe is to evaluate industrial history, preserve these marks (like "scars") instead of decorating them, to re-use local materials, multifunctionality and openness to different usages. Such a strategy is widely prevalent in former industrial areas during last ten years. Ideal-romatic wish to renew "natural" and hide industrial period as ugly is falling back. Former industrial regions are turning into landscapes without taboos, where occasion of experiments is the gratest.

△ **Figure 2.**

◁◁ **Figure 1.**

Kohtla-Nõmme

Workshop was held in cooperation with finnish architects and environment artists Sami Rintala and Marco Casagrande in Kohtla-Nõmme mining village.

Background

After a long agricultural period the village of Kohtla-Nõmme became a monofunctional town for oil shale mining in 1931. The Soviet period encouraged the mining industry. In April 2001 the mine was closed down and the village became unemployed.

Present situation

Horizon of future is hard to be seen under times of depression. The village is waiting for the new way. After the closure of the mine the sociological and individual problems are big. Under these terms the change must be big as well. The same pattern of closing mines, unemployment and sociological problems is typical for the whole region of Ida-Virumaa.

Future vision

Ida-Virumaa has the infrastrucure for heavy industrial transport and energy production. It is also a region of wetlands and ex-Soviet non-farmed fields. We suggest the region to be the leading producer of industrially produced biomass in the world. The vegetation is used for creating bioenergy and building material. It also helps in filtering pollution and takes down the rate of polluted waters running now into the Gulf of Finland. We stress the scale of the change – it must concern all the region and all the areas suitable for planting.

Installation "Goldfields"

Goldfields is a part of the new way representing the scale of the change and the new industrial landscape. The landscape installation is made out of planting 3000 concrete ironing bars into the surroundings of Kohtla Nomme mine.

After studying the Ida-Viru area and specially the community of Kohtla Nõmme, it has become clear that it is standing on the edge of a new era. Though the situation might feel depressive and even hopeless,

there is also the other side of the coin on which we have been consentrating on. We see the huge potential of this area – the industrial infrastructure, the environment itself and the people used for diciplined hard labor. It looks like all this potential is now resting or laying down without any effective use – waiting for a new reason to be activated. In a way the situation is exellent for a new start. It is not little that you can offer for the future.

We want to see all this capacity in work again. To gain this we must be clever to make a sustainable solution for the future. The solution / change must also be big scale, it must effect all areas of the society, everyone is involved. People are the ones who will make the change and for helping you we need political decisions and funding for the development of sustainable future in this area.

The change that we are strongly suggesting is bioenergy. Bioenergy means burning organic material, such as tree of turf – but in this case we mean industrial planting of biomass as effectively as possible, plants like willow and cat-tale. The production must be big scale in order to make it profitable – you have a lot of wetlands and non-farmed ex-Soviet fields, all those shall be used for producing biomass. The industrial infrastructure with its railways, factories and power plants will be used for processing, transporting and creating energy. The biomass is also suitable for basis of building-material, which should also be tested here.

Politically the suggested new way is temptating. We would be showing green light from Estonia to the rest of the world, changing industrial areas into ecological and sustainable production of biomass. By doing that we would also help cleaning the polluted ground. The biomass plantations should be used for filtering pollution and avoiding it getting into the Gulf of Finland. In that sense the project is international, concerning also other countries around the Baltic Sea.

The change is enormous, but that is nothing new. It has been done before. In 1931 this area decided to move from agriculture to mining. Now we are mixing both of the knowledges for industrial agriculture.

Figure 3.

Figure 4.

2. Sillamäe

Next workshop was in Sillamäe. This "white patch" on the map was established during soviet time for the war industry. It is still known as closed area, "forbidden city". Such an image creates various myths like ugly industrial environment, lots of criminals, drug addicts, radioactive refuses etc.

Of course Sillamäe has problems but these are not prevailing. At the place appears a beautiful and stylish city, locating at naturally good place on the cliff next to the sea. There is architecturally valuable stalinistic ensemble which is unique in Estonia, romantic parks, pleasant people. Sillamäe with its parade steps and festive architecture reminds the summer resort Odessa at the Black Sea. The town itself is clean and safe, rate of criminal is quite low. No drug addicts visible on streets. By statistics their percentage is lower than in Tallinn.

So, several myths break up at the place. At the same time myths are feeding our fantasies. Cities need positive myths. In case of Sillamäe arose the question: can the closeness be as a positive sign, speciality of the city? We have Pärnu as a holiday resort and Tartu as town of university, why can't we add to this row a mysterious forbidden city Sillamäe?

During the workshop we debated a lot about borders. Border-line between land and sea was the principal. Periphery is interesting and intensive. The sea is the greatest potential for the Sillamäe, which is completely disused now. Though the new seaport may change this situation remarkably.

Sillamäe has clear natural borders on all sides, that support spatially idea of closed city. These are sea on one side, road on the other side and river Sõtke which separates factory from the town. The town has turned its face inside. Passers-by hardly can imagine, how stylish place is locating just aside. Under the anonymous skin is hiding itself original, a bit old-fashioned, but interesting town.

Installation is the most essential part of workshop. It's strong visual tool, what induces people to think about the situation, analyse their hometowns qualities. It's

intricate to find right place that touches particularly many people personally and so turns slogan into reality. We wanted to give to Sillamäe a positive impulse with our work, to give them courage in finding new ideas and also support the existing environment.

If previous workshop in Kohtla-Nõmme had one clear problem and solution for it, what was realized, then the situation in Sillamäe was opposite. City is sophisticated and problems fragmented. So we decided to realize more than one idea for installation this time.

Short list of installations:

Pipe-tram
The heating pipe on the ground marks the city's weird relation towards the open public space and the heating economy. The pipe cuts the city from the seashore. With thick bushes around it creates a dangerous no-mans-land, where only a drug-addicts feel themselves comfortable. They like to sit on the warm pipe when the weather is cold, and of course inject themselves.

This project is an attempt to change the place from divider to a connecter. Students tried to show that mixing different elements of public space we can create a new situation where the critical place can turn into attractive and more safe public place.

Lighthouse
The word "lighthouse" is full of fundamental meanings. The bordermark is related with both sides – the sea and the land.

The light installation is located at the end of Mere boulevard, being a connecting point between a huge seascape and the heart of the city. The installation shows the hope for the better future.

Reload
This installation is visualising the city's relation towards the sea. It is rather artificial than natural – like a view from the window, that one can open and close with a curtain for example. The city has no strong contact with the nature itself.

Figure 5.

The installation is dealing with cognitive tasks and binar signs like openness-closeness, real-imaginary. It indicates to the need for better connections between both sides.

Port Sillamäe
In Sillamäe there are people waiting for the "white ship". This project gives to inhabitants of Sillamäe possibility to make their own "white ship". Small boat that belongs to one person, family, class or club. All things start from dreams or wishes. Your own will should be formulated and put on the board of the ship. Formulated wish is better than abstract expectation or distress.

Port Sillamäe installation consists instruction for folding a boat. At the opening day they collect folded boats with wishes and take them to the open sea.

City Game
The project is a joyful interactive game of redis-covering the city.

There are photos hanged up next to the Culture House with the rules of the game. Photos are taken from untraditional places of the city or usual places from different point of view. A player has to find those places and gets a prize at the site. The game was especially popular among the children.

Dry Stone Wall
The town is locating on the border of land and sea. The sea is large and dangerous, the town is small and vulnerable. The town is accumulated into a cluster to defy open sea winds. Dry stone wall on the border of land and sea gives occasion to feel that border, to meditate about it and wait for the "white ship" – realizations of their dreams. Borders are unstable and unforeseeable. Strong storm changes the location of the sea and stone wall disappears under water. Nature is still unforeseen and more powerful than human and transforms our intentions.

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On Continuing Education

What can universities offer their graduates except for further degree studies and alumni activities? How do universities respond to working professionals´ needs for continuing education?

The rapid development in information and communication technologies and the emergence of a digital and global economy cause profound changes in work cultures and profession competencies. Work in organizations is increasingly structured in teams and thus relies on the collaborative expertise of teams and networks rather than the expertise of the individual. Professional competence is an ongoing learning process, not something stable and once obtained. Learning in Knowledge Society is about collaboration and the ability to function in changing, often multidisciplinary communities and networks. New pedagogical models are needed to support this learning.

During the Cumulus conference in Tallinn, a small working group came together to discuss university adult education. The aim was to open up a discussion on adult and continuing education. We wanted to map different ways to approach continuing education in Cumulus member countries and to search for possibilities for collaboration or even joint educational projects. The work continues in upcoming conferences.

Adult and continuing education in Finnish universities is usually organized by continuing education units, but also by faculties. The specialized units typically organize and coordinate a variety of adult education activities – continuing professional education, Open University studies, employment education and business services. Continuing education is here defined as post-degree education for working professionals, aiming at updating and deepening the professional skills and competence.

The form of the education varies from short seminars to specialization programmes taking several years to complete. Teaching is provided by the university staff, but also by experts from a network of business professionals. Collaboration with other universities is essential in multi- and interdisciplinary education.

A growing share of the activities consists of training and development programmes arranged on demand and in close cooperation with customer companies. Companies seek to strengthen the professional competency of their staff, and often present highly articulated educational needs. University continuing education aims to provide companies and working individuals with an access to current research, top know-how and innovative thinking along with a pedagogically advanced approach. As customers pay for their education, the education is consequently arranged to meet the customer's needs in a cost-effective and compact manner. On the other hand, university teachers and professors gain from the direct contacts to the professional field – valuable knowledge on real-time professional thinking, practices and educational needs is transmitted to the university staff, knowledge that sometimes may reach the academic community slightly delayed.

This is also how our unit, the Continuing Education and Development Centre at the University of Art and Design works. We focus on enhancing the co-operation between the academic and the business world. Our work is based on monitoring the labour market and responding to changes in professional qualifications. Our customers are graduates from our own university and other universities, but also

professionals in marketing, publishing and communication, to mention a few.

Arabus Business Center is a business incubator at the University of Art and Design, that houses annually around 20 enterprises. Arabus offers framework and services for long-term development of enterprises that work in the field of design, media and art. Arabus operates in close relation with the educational activities at the Continuing Education and Development Centre, entrepreneurs providing both a resource of expertise but also utilizing the education services.

Innovative ways of combining business development and education are being developed, that emphasize networking and sharing of knowledge and skills. One example of ongoing work of this kind is the case that was presented in Tallinn. *Heads and Hands – Design from Finland* is an internationalisation project for media, design and crafts entrepreneurs. The 28 participants, some of them Arabus entrepreneurs, are developing their businesses, building a well-functioning network and creating a practical model how to jointly develop their international activity. This in carried out by regular meetings and lectures, workshops, business consultation, sales events in target countries and support in creating marketing materials. Results are already to be seen: emerging joint projects, new customers and corresponding turnover, international contacts and, on a very practical level, improved presentation materials and skills. Please visit our website – the new Heads and Hands website will be published in the near future.

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Options for Art Educators Presented by the European Art Education Network

Introduction

by Martina Paatela-Nieminen and Jukka Orava

Different virtual network possibilities for co-operation were presented at the Cumulus work-group meeting for art educators. First, Professor Stefan Sonvilla-Weiss (University of Art and Design Helsinki UIAH) presented context and strategies for the international MA-programme "ePedagogy Design". Jukka Orava (UIAH), coordinator of the European Schoolnet Virtual School Art and Design Department, explained the possibilities of the European network.

Second, some cases from virtual art education were presented. Professor Tom Davies (BIAD) explained embedding technology: experimental workshops in art and design education. New media, as the technologies of the past, can present a challenge and a threat to those antipathetic to change. Martti Raevaara (UIAH), Head of a MA eLearning Program Virt@, explored new ways for art teachers training in Virt@. Martina Paatela-Nieminen (senior researcher, UIAH) showed examples of how an inter-textual method for post modern art education has been applied in virtual art education (Virt@). Tarja Trygg (lecturer, UIAH) described the different European networks in art education and also showed her global solarigraphy project.

Third, there was a most interesting discussion about the art education network. There is a need for the exchange of ideas and information as well as for discussion and forming partnerships. For example, Marjolijn Brussaard (course leader, Utrecht School of Arts) informed the group about a new Socrates project for which she is looking for partners. The attendees started a mailing list for further discussion about how to organize this network.

Martina Paatela-Nieminen and Jukka Orava

Embedding Technology: Experiment Workshops in Art and Design Education

by Tom Davies

New Media, as the technologies of the past, can present a challenge and a threat to those antipathetic to change.

This presentation drew on the historical significance of the first Municipal School of Art in the UK. The School of Art, in Birmingham, has been a national exponent of "taming the technology" in art and design education and making it serve the interests of creative development rather than dictating a particular priority. The 'experimental art laboratories' of the 1890's brought together the emerging technologies of the 19th century with the traditional values/concepts of art making/production. A fusion of Fine Art practice, Design and Craft provided a model that others would follow (Central School of Art/Royal College, London).

Informed by the philosophies of Pre Raphaelitism and the Arts and Craft Movement, working practices evolved both in terms of pedagogical methodologies and the practical outcomes of studio/workshop practice. I like to think that this tradition continues today in the form of our Initial Teacher Education programme were "Curriculum Workshops" represent a conceptual link to the 19th century in challenging existing patterns of working and established school orthodoxies. Just as then, the rationale is to critically analyse assumptions and speculate as to different strategies and opportunities.

The ICT workshops especially embody the search for new forms of making and investigating curriculum content. Over the last 6 years Pete Worrall and I have attempted to embed the new technology as a dimension of working practice. We adopt a policy of advocacy over radical reform and each of our contributions to curriculum development have provided the dissemination of current practice, experimentation across the age range and models for teaching and learning in specialist art and design.

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Context and Strategies for the International MA-program ePedagogy Design

by Stefan Sonvilla-Weiss

MA in ePedagogy Design is an international study headed by the University of Art and Design Helsinki in cooperation with Birmingham Institute of Art and Design, University of Central England and the Institute of Aesthetic Education, University of Hamburg.

The aim is to create a MA (Master of Arts degree) program (60 credits) for visual pedagogy and knowledge building in eLearning called ePedagogy Design. The planned curriculum relies on the complementary areas of expertise of the partners. Their skills and knowledge provides the dynamic hub required to deliver an innovative, interactive interdisciplinary curriculum, which encompasses the pedagogical vision of the visual dimensions of ePedagogy and its expansive opportunities. The Curriculum Development (CD) application for financial support has been successfully approved by the European Commission (Erasmus) June 2003. The official start of the MA program will be spring 2004.

One of the rationals in building up this program is based on the growing need for visually oriented pedagogical experts such as teachers, tutors, designers and developers who are capable of community knowledge building and collaboration with other experts from different fields both from private and public sectors.

The language of the project and envisaged outputs is English (EN). The creation of the curriculum will be based on the partner institutions, existing curricula and professional areas, in addition it will reflect different research areas and expertise of the partners. The ePedagogy Design programme curriculum consists of modules/courses, which can be integrated into each of the participating university degrees or programs.

Spin-offs expected from the project course programme includes several projects with educational organizations and private sector enterprises which allows practical implementation of possible pedagogical and visual innovations and research data. This kind of collaboration will help the students employability but will also allow and merge innovative developments in the collaborative organizations.

Envisaged curriculum modules:

– Media and communication theory and research
– Visual learning, Image pedagogy
– Didactical analysis and design of multimedial learning environments
– Instructional Design: theoretical gound studies and models
– Instructional Design: learning environments
– Networks and communication
– Computer graphics and visualization
– Media technical basics
– Sound and video
– Authoring systems
– Economic basics of ePedagogy
– Practical training
– Master thesis.

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An Intertextual Method Applied in an Art Education MA eLearning Programme

by Martina Paatela-Nieminen

Firstly, in my paper I would like to talk about intertextuality, giving my definition of it and explaining why it is a fruitful method for art education. Then I will go on to discuss the intertextual method as applied in art education teaching practice as part of a course in an art education MA eLearning programme, VIRT@, in the School of Art Education at the University of Art and Design Helsinki [1]. Finally, I will sum up the main conclusions that I have come to.

Intertext is a theoretical construct that serves the process of reading/looking, interpretation and signification. I developed an intertextual method especially for art education research in my doctoral thesis [2]. This method has been created for studying the relations between different "texts". I take the term text to mean both visual and verbal signs. When we for example study a work of art using the concept of intertextuality it means that the work is studied subjectively, in relation to culture. The researcher is not only interested in a work of art per se but rather in its several cultural, intercultural, intersubjective and intermedial relations. I use intertextuality "poetically" for "weaving textual relations and meanings together". Despite being open-ended and subjective intertextuality offers a clear method for postmodern interpretation.

I wanted to apply the intertextual theory in art education practice. In this article I will concentrate on a course on children's literature and illustrations which forms part of the VIRT@ MA eLearning programme [3], a qualification training scheme for art teachers at the Virtual University. The training scheme in VIRT@ is especially intended for art teachers without formal qualifications who work in outlying, sparsely settled regions; the graduates from the scheme will mainly find positions in the schools where they have previously worked without formal qualifications. I had 13 teachers in my course, with different backgrounds in art education. I will show illustrations produced in this course in order to make visible how the method has been applied.

I also asked the students to evaluate the method that they have learned virtually. One aspect that they found difficult was the theoretical vocabulary. However, they were enthusiastic with the method itself. All students liked the potential it offers for studying illustration in relation to its historical context, to the context of other illustrations and to the cultural context. The illustrations could be studied profoundly in relation to different contexts, layers and to the whole culture. Many students wanted to apply the method in their own teaching.

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9/02	**COLLE DI VAL D'ELSA**	Istituto Europeo di Design
10/03	**TALLINN**	Estonian Academy of Arts

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