Designer or Artisan

-Design versus Craftsmanship in Digital Design

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Abstract: As we are approaching the Information – or Post Industrial – Society, we need to question the implications for those designing artifacts for this new context. We therefore present a paper on practice-based design education, for a context in which design has evolved from the requirements set by the Industrial Society to the ones of the Information Society. It is a context that closely relates to the currently emerging situation where Information and Communication Technology (ICT) move from the desktop to pervade most aspects of our everyday world. We show that qualities inherent in the ICT require a deeper understanding of the digital material than common sense seems to demand. There is an urgent need to not only understand ICT as an efficient tool but also as a "design material" with a unique set of characteristics. In order to achieve that, we believe that designers need an understanding of ICT that more resembles the traditional craftsmen's relation to materials and tools. Our analysis indicates that efforts should be concentrated on issues concerning aspects of technology, integration and disciplinarity. These issues involves a new kind of a more open and instant prototyping environment (the versatile technology aspect), used in temporary design teams (the broad integration aspect) where different professions can develop their own specialization (the deep disciplinary aspect). Finally we suggest an approach based on what we call CraftLabs, a node in an open network of competencies, inviting other parties to engage in the development of future products and educational frameworks.
Key words*: *Design Education, Ubicomp, Prototyping, Conceptual Components, Digital Art, Digital Design

1. INTRODUCTION

1.1 The industrial versus post-industrial mindset

When Adam Smith made the competitive advantages of 'division of labor' evident [1], he not only paved the way for the industrialized mode of production, but also for an evolution in which craftsmen either had to move in more artistic or more industrial directions. Those moving in the industrial direction were divided into 'implementers' and 'specifiers', roughly corresponding to blue-collar workers and designers. In Scandinavia the new design profession typically grew out of two distinct educational traditions, that of Arts and Crafts on one hand, and Architecture on the other. This division roughly corresponds to the 'implementers' and the 'specifiers' of the pre-industrialized society.

Even though we are currently approaching post-industrialized society, this background still has a profound influence on contemporary industrial design. Industrial design incorporates three perspectives: those of the artist, the general expert and the engineer. At one extreme, we can recognize the *artist* demanding total personal freedom of intuitive expression. The artist stands in contrast to the analytically skilled *project leader* who believes that mastering the design process will satisfy even the most demanding client. The third extreme is represented by the *technologist,* seeing opportunities everywhere without being hampered by established engineering rules and know-how. Today professional industrial designers usually represent different blends of these three perspectives.

Even though the perspectives can be blended in many different ways, there are a few core skills that generally distinguish the industrial designer. Crucial examples include the ability to bridge the gap between the wishes of a *specific* manufacturing client and the needs of a *general* user, the ability to explore new possibilities, and the communication of these possibilities in both tangible and visual ways. Industrial design typically applies these and other skills to the physical products that are the hallmark of industrialized society [2].

Today some of the characteristics underpinning the development of the professional designer seem to have eroded and are being replaced by a set of completely different features. The most obvious change is the way in which products tend to acquire a virtual dimension, in addition to the more physical ones, often facilitated by the present development in information technologies and communications, including the internet and "ubiquitous computing" [3]. However, just as fundamental are the perhaps less obvious changes in the manufacturing process. As the manufacturing of digital and physical artifacts tends to be relatively cheap, and development cycles more rapid, product development is not as "manufacturing driven" as it used to be. When manufacturing capabilities become more of a commodity, as they have, for example, in certain developing countries, manufacturing also become less critical for both competitiveness and design requirements.

These changes create profound implications for both the mindset and the qualifications needed for the designer. The client need not necessarily be a *specific* manufacturer any more and, due to new possibilities of customization, the user might not be as *general* as before. Understanding the "use" of the product might become more critical than how it could be manufactured, "experiential features" [4] become just as important as visual features etc. In addition, the design of the products tends to become more integrated with manufacturing. The prototypes evolve seamlessly to a complete product[1], where the need of "digital craftsmanship" becomes more critical than the capital intense manufacturing equipment of the past. In fact, the further down we move in this evolutionary stream, the harder it becomes to distinguish the digital craftsman from the digital designer. So, as a paradox, one could also claim that we are moving to a situation where design, craftsmanship and production again become just as integrated as before industrialization. Hence, hypothetically, one might claim that the past division between "specifiers" and "implementers" tends to disappear.

What does all this mean when educating designers having their professional career in front of them? In order to address this issue, we started an experiment five years ago, at the School of Arts and Communication, Malmoe University, Sweden (fig. 1).

[1] In fact, not only the designer but also the customer becomes more integrated in the manufacturing phase. Alvin Toffler [5] identified the phenomena already in the early eighties when he coined the concept of "the prosumer".

Figure 1. Exterior of the School of Arts and Communication

1.2 The experiment at Arts and Communication (K3)

Arts and Communication is characterized by an aesthetic-technological-critical orientation, which combines design practices, modern information technology, new media and academic depth with design, culture, society and social engagement. Education at Arts and Communication is organized in undergraduate and graduate programs including Interaction Design (an education in shaping the use qualities of interactive artifacts), Interaction Technology (a three year design program exploring the capabilities of current technologies and object-oriented programming languages), Physical and Virtual Design (a three year esthetical design programme, where competencies from graphical, industrial and interaction design are taught), "Imagineering" (a one-year program where technicians and artists perform project-oriented work side by side), Performing Arts Technology (a three year program where the technology of performing arts are applied in a range of different contexts). From a pedagogical point of view, a substantial amount of the education in these programmes is organised as projects with a "Problem Based Learning-approach" borrowing qualities from different traditions such as engineering, design and media studies. There is an explicit goal to integrate education and research. Many students are therefore involved in research projects and most researchers are also utilized as educational resources.

But just as important as the portfolio of programmes are the way these programmes are expected to interact, an interaction that's characterized by an interdisciplinary approach rather than a multi- or cross-disciplinary one [2]. As an example are every bachelor programme repeatedly involved in "common projects", where teams of students work together utilizing their own core competences in a simulated professional manner. Our initial hope was that the competencies inherent in the programmes mentioned above should provide a sufficient base of knowledge to simulate future product development in a meaningful way.

K3 is housed in a renovated industrial building in the Malmö harbour area. The space was designed with both educational and research activities in mind. The research activities are primarily organized in inter-disciplinary research studios supported by laboratory resources, design spaces, experimental rooms and spaces for exposition. The educational needs of K3 have been addressed in several different ways. Originally the physical facility was organized around "homerooms" in which each cohort within each program had its own space. In this setup, program identity was strengthened, but special competencies and communities of practice failed to develop. Recently the homeroom system has been replaced by dedicated labs, in which resources are primarily organized in shared disciplinary or functional labs such as Sound studio, Video Editing, 2D-lab, 3D-lab etc.

2. METHOD

Implementation of K3 was based on a founding vision document, “Manifesto for a Digital Bauhaus” [6]. Having a ‘vision’ rather than a ‘problem’ or a ‘hypothesis’ as the driving force emphasizes the ambition of being a design project in itself. It gave a clear and unified direction for both employees and students and hence a rather consistent result that we now can scrutinize and continue to build upon. So after five years of experience shaping this educational vision, we are compelled to engage in reflection upon what has been achieved. Once again we can draw upon the Manifesto for a critical process: “knowledge grows in a spiral of action and reflection” [6]. Just as this forms the foundation for the educational experience at K3, so it also must be applied as a method of critiquing the design of the institution itself.

3. RESULTS SO FAR

K3 has already gained a reputation of being a dynamic pedagogical project. For such a young institution there is a rather impressive list of both national and international awards. Some examples are: (i) KTREE; 2nd price, Eurocities award Barcelona 2002, (ii) GIGANT; 1st price, the Future Visionary Challenge, Nordic Interactive Conference 2001, and (iii) KLIV; 1st price in ‘Dagens Medicin’s’ yearly competition as the best and most innovative IT-support for the healthcare sector, 2002. Student projects range from software- to hardware-related projects, typically inspired by research and/or user studies performed by the students themselves. Most projects are consumer-product related, conceptual rather than finished in scope. However some projects also address design problems by suggesting new kind of prototyping tools and environments that focus on both software and hardware aspects. Below we describe a couple of these projects in more detail.

Figure 2. MoodBody – emotions in virtual space

3.1 Common Playground[2]

An example of a software-related project is the 3D prototyping environment ‘Common Playground’ [7]. The playground is built on a series of small Java applications developed in our research and master thesis projects. These *components* work in different ways on top of a real-time 3d game; in our case Half-Life and more recently Serious Sam. The main idea is to let the students develop and exchange components with each other as well as different research and game communities on the Internet.

[2] Common playground has recently evolved to a funded joint project between Arts and Communication (K3), Det Jyske Kunstakademi in Denmark and Croteam in Croatia

In one of the research themes in Digital Art, students were introduced to a series of paintings from the late 19th century, all of which communicated a certain mood. The idea was that traditional artists often have a close relationship with both the tools and the material they are working with [8]. In confrontation with the material, new ideas and decisions take place constantly. In this situation of give and take the artist soon learn the limitations of material and tools - in our case software. But it also reveals possibilities and directions s/he couldn't imagine beforehand. So instead of letting the students observe and evaluate a 3D game or a graphical artist's work, they were forced to go into a new domain and to learn a new piece of software, trying to create something as challenging as a room or a world that communicated a certain mood. They had two days of training and then they spent about 8 to 12 days building their worlds. Students were also introduced to different websites dedicated to Half-Life and Half-Life editing. They were encouraged to set up their own discussion list and take part of the several other discussions list about Half-Life editing and to download scripts and models to use in their work and part of the learning process. The overall impression by the students was that the editor wasn't that hard to learn (World Craft 2.2). As the students gained experience the crashes came more infrequently and in the end they actually felt that they could work around most shortcomings. They found out that when they eventually passed the threshold and got a grip of the editor it was engaging to work with. At the presentation the students were allowed to play each other's worlds and make notes of the feelings they experienced. The result was encouraging, as many as 80% of the students had actually managed to communicate their intentions (fig. 2).

Half-Life has made it possible for us to try different scenarios in a short timeframe, and at the same time do several design iterations. The strategy of building separate middleware modules (Foresite Designer [9], Mixed Reality Platform, Game Rules and Trace), providing them to students, and encouraging them to share their components has made it possible to separate the development from 3D applications or engines. This enables us to use the 3D environment in many different ways without starting from scratch each time.

3.2 iProps

iProps is an example of how two interaction design students [10] developed and evaluated an integrated hard- and software prototyping tool. In iProps both software and hardware components are integrated, but not necessarily built together. Instead, a hardware component, such as a model of a mobile phone with display and buttons, would be developed, but without any real computational resources. The computation is rather performed on a PC with normal phone interface prototyping software, applied to a virtual model. But as the physical model is hooked up to the PC (by wire or wireless), it can still be experienced and evaluated as a real mobile phone. So instead of using the mouse to manipulate the virtual model the physical one is used. And in the place of feedback in the virtual model, a mirrored version is displayed on the physical model. The shell of the physical model is typically made in a "3D-printer" (Stratasys 1600), then equipped with ready-made components such as buttons and displays, including all the software needed to run them in concert.

The students' hypothesis was that the prototyping environments available today didn't pay enough attention to the physical interaction. Simulating the use of a mobile phone, PDA or any of the new "ubiquitous computational products" cannot be done in a meaningful way by interacting directly - via the mouse - with a virtual model on a PC display. In their thesis they concluded that their hypothesis was correct. But they also had to conclude that it was a very time-consuming task to produce the integrated model they needed, *as long as all components and software needed to be produced from scratch*.

4. DISCUSSION

Both these examples address a general frustration regarding the ability to produce representations of designed artifacts that actually convey use qualities. If we are only concerned with the visual appearance, then a traditional illustration or a foam model would be sufficient. But if we also are designing an "experience" [4] – focusing on use rather than looks - we also need the means to communicate and test interactive behavior.

It is obvious that we have not learned how to use digital materials as a "design material". We know how to use computers and software as tools (e.g. CAD) when designing traditional products, but we still have a lot to learn when it comes to seeing digital material as a design material in itself. However it is not so strange, as digital design is not as mature as traditional design, and digital material have characteristics that differ a great deal from those with which we are accustomed [11]. Digital materials are usually more complex and flexible, less transparent and tangible. But above all, it is more cumbersome to learn and produce than most students realize.

One possible role-model addressing the encumbrance is the open-source, hacker approach. Appropriate questions could therefore be: what can *design* learn from the more *craft*-like hacker and open source culture? Is the distinction between the designer and the artisan starting to disappear?

Another approach to managing the encumbrance is to establish a library of reusable components. As soon as one could reuse old components in parts of one's design, the workload could be reduced accordingly.

5. CONCLUSION

We have taken some necessary steps in an interesting direction, but we still have a ways to go. Generally speaking, we have not paid enough attention to the inherent differences between physical and digital design materials. More specifically, we are still fumbling in our attempts to prototype interactive behavior. In order to address these shortcomings, we believe students need a modified set of disciplinary, organizational and reflective skills:

- We believe there is a need for a more profound relationship to digital materials and tools [12], one that more resembles the traditional craftsman's grasp than the merely rhetorical "possibilities" flourishing the school today.
- We believe that increased complexity in contemporary product development calls for *both* disciplinary depth and integrative skills.
- In order to handle the complexity and dynamics of today, we believe students need an understanding of how contemporary production systems work, where co-operation goes beyond traditional educational "group-work" and instead moves toward a more professional teamwork approach. It's therefore important to strengthen and further develop approaches as those we already have implemented in our "common projects" (discussed in 1.2).
- We believe in "Reflection in Action" [13], but we have also realized that superficial action easily leads to superficial reflection.

To summarize; we believe we need a new kind of a more open and instant prototyping environment (the versatile technology aspect), used in temporary interdisciplinary teams (the broad integration aspect) where different professions can develop their own specialization (the deep disciplinary aspect).

6. FUTURE WORK

6.1 The CraftLab

As a first step, we plan to launch an internal educational project called the CraftLab, a lab where students at different levels can work together with skilled artisans, researchers and staff in interdisciplinary teams doing research and commercial projects. This is a project based on a hybrid structure, in which our competencies in the more reflective Scandinavian tradition of user-based design gain new vitality from the North American industry-sponsored studio model, a setting where prototyping and "action" is more predominant.

6.1.1 Project introduction

At K3 we see a pressing need to create CraftLabs in which communities of interest can be identified around a variety of creative practices [14]. A long-term goal is that CraftLabs evolve into sustainable "ecosystems" [15] of diverse practices enabling interdisciplinary production and learning environments. These sites will reach beyond turf-protective notions of labor division and external expert support, found in mere multi- and cross-disciplinary approaches [2, 16, 17]. We imagine these spaces evoking the sort of behaviors that are associated with the open-source software movement, in which "gift economies" reward those who contribute most to the shared well-being of the community. The CraftLab will serve as a repository of modular component libraries that can be repurposed at will, and the virtual counterpart to the lab that we develop will extend these offerings to international partners and allow us to participate in new global efficiencies of knowledge sharing [18]. Future products will intertwine physical and digital aspects, creating complex instances of what Marc Weiser calls "Ubiquitous Computing" [3]. This complexity calls for new learning environments where students, among other things, will have an urgent need for first-hand experience of production technologies in a context that resembles an appropriate design and construction environment.

6.1.2 Project outline

We propose using the present digital 3D lab at K3 as a point of departure. Today it's not much more than a traditional computer lab. K3's educational programs use the lab to give students an introduction to 3D modeling in Rhino, SoftImage, 3D-Studio or IronCad. In our prototype craft lab, we envision long-term productions combining students, faculty and outside partners, allowing participants to experience design cycles which move more like large research or production assignments. We propose to develop the lab in the following sequence:

1) Students from our technical and design-related programs will participate in long-term ongoing projects.
2) Each project will be expected to deliver different general components designed for reuse. Components could include "deconstructed" input devices such as a scanner, a button, or a RFID-tag reader. These components will be organised as modules in an open library accompanied by code to run them. An example of this sort of component development is InfoMus lab in Italy, which has created an open software platform (freeware) for the development of real-time music and multimedia applications [19].
3) The components in the library will eventually be modified and reused in new projects. We also anticipate sharing these components broadly with other research partners, thus fulfilling the crucial need for middleware that allows one to bridge the gap between different digital environments and software.
4) For the masters students it will be compulsorily to package their thesis work in something we call 'conceptual components', in other words, a semiformal structure for articulating a transferable knowledge

contribution from a design process. The student will hereby be forced to point out the unique qualities that differs their work from others and by that it will also enrich the library, enabling other students to use components “off the shelf”.

In order to realize this process we will:

- Develop a community-based learning approach. This includes organizing groups of students, developing projects proposed within Arts and Communication or by external partners, making sure that the most knowledgeable persons actually are available to work and mentor in the lab, and promoting initiatives taken by the students.
- Focus on the craft of digital practice by devoting time to master the appropriate tools. Projects within Ubiquitous Computing are, typically, so technically challenging that teamwork becomes a necessity. Therefore we would like to capture the positive "hacker" energy that results when design contexts and projects are challenging, and when projects are performed in interdisciplinary teams where different perspectives meet.
- Increase the capabilities of the lab, including different ways of physically and virtually prototyping and simulating products. An important aspect is the ability to move between and integrate both virtual and physical aspects of a product design, with enough functionality to also prototype realistic interaction and experiences [4, 10].
- Encourage an interdisciplinary approach where co-operation with internal sources is facilitated. In a possible vertical integration, similar disciplines would be able to work together in large projects from undergraduate to the research level. But the lab will also support horizontal integration in which 3D could join forces with other competencies such as other design disciplines, culture studies, engineering etc. We are consciously aiming for an eco-system, where the robustness is found in the diversity and combinations of different autonomous disciplinary skills. We also believe that these differences promote "creative tension" and the "contrasts" needed for fruitful reflection.
- Encourage an interdisciplinary approach where co-operation with external sources is facilitated. Among other things, this implies a demand for an open channel to potential partners. Therefore, as a virtual counterpart to the physical venue, we will establish a website where special attention is directed to the problems usually associated to traditional sites (e.g. content and update issues). The measures necessary are strikingly similar to those of the physical venue. We need a moderator facilitating the site and a community with a genuine interest in the content of the site. The site will therefore not only be a presentation site but more importantly a project platform, a user forum, and a repository for a digital modular component library.
- Support faculty skills development. This is an often neglected concern that a project like this must address. We believe that the best way to stay updated and develop necessary skills is to actively participate in the learning community.
- Involve different stakeholders as *artists*, *project managers and ‘technology freaks’* who own their projects, but still feel that they would gain from assistance and co-operation.

6.2 An open call

Anyone interested in participating in a global network addressing problems discussed in this paper and contributing to a shared production and educational environment? To fully utilize the potential impact of the CraftLab we depend on co-operation with other parties having similar or complementary competencies. So, please, anyone who feels that this approach fits their interests, contact us at hakan.edeholt@k3.mah.se. Thank you!

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