

# Multimedia: interdisciplinary challenges to design

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## Abstract

The term multimedia is often used for research into getting new media, like sound and video, into the computer. In recent years activities have escalated. Many new research and educational activities have been initiated, also in Scandinavia. The label multimedia has been broadened to include research in, e.g. video-conferencing, hypermedia, CSCW, virtual reality, robotics, and digital theater. Accordingly, the field is opening for many new and exciting interdisciplinary challenges. We propose that the IS community could get an important role in engaging in re-conceptualisation of computer artifacts from the perspective of use. We should focus on concerns for advances in interaction technology, new domains beyond work, new ways of working in interdisciplinary teams, and

new ways of working with users who are not established in a well-defined work setting.

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## Introduction

In the US, multimedia technologies have been on the research agenda for several years. MIT MediaLab<sup>1</sup> has combined research in media arts and engineering/natural science since 1985. Until recently, however, multimedia applications have mainly been gadgets with little anchoring in real use, and their designers have been little concerned with usefulness. As multimedia technology steps out of this role, it challenges IS research in a number of ways that will be discussed here.

In the Scandinavian context, multimedia research has been picked up the

IS/participatory design communities, which are interdisciplinary by tradition. In contrast to, e.g. the MediaLab, they focus on relating technologies and design processes more directly to human practices, at home, at work, and in the general public. We will illustrate some potentials and challenges for this community, based on experiences from the Danish multimedia initiative, InterMedia,<sup>2</sup> which was created in 1996.

Today, InterMedia is an umbrella for education and research projects, such as digital theater; distributed education; virtual project rooms; usability labs; Intranet applications; electronic commerce; medical visualisation. These projects involve people from a wide range of disciplines such as: computer science, dramaturgy, information and media science, architecture, industrial design, social science, medicine, psychology, engineering, and arts.

To mention some examples, we are involved with the virtual project room project focussing on development of augmented/mixed reality rooms to support industrial designers in remote collaboration on design. The Usability work project (BIDI) (Bødker & Halskov Madsen 1998, Graves Petersen & Madsen, submitted for publication) develops practical new ways of working for interdisciplinary design teams, called the usability workshop. In one such usability workshop, multimedia design became an issue for a well-established design organisation, consisting of industrial designers, engineers and psychologists, normally working on HI-FI product.

InterMedia provides Bachelor, Master and PhD level education as well as an Open University program. These educational programs illustrate the challenges

of interdisciplinary education combining computer science, information and media science, aesthetics and architecture. The courses allow both students with, e.g. an aesthetics and a computer science background to attend. This is facilitated through interdisciplinary group work through which the students learn to establish a common language game between multimedia systems developers and multimedia content providers. This common language game is important for real world projects of high technical and aesthetical quality. A main challenge is to make the disciplines understand so much of each other that they can get a creative and productive collaboration going, involving also use and users. We are *not* aiming for students to reach the same level in all subjects being taught.

### Research issues and challenges

In our understanding the bulk of Scandinavian research, as well as most practical systems development methods have been concerned with information systems. With multi-media, and with the wake of advanced interaction technology, the information systems thinking needs to be confronted with applications that are concerned less with IS interfaces in the classical sense and more with a spectrum of interfaces from small handheld devices to all-encompassing immersive VR technologies. This is even more severe, since the IS tradition has had little to offer regarding keyboard, menu and mouse interfaces, at the same time as most of HCI research and practice has had little concern for neither actual use settings, nor wider design methodological issues. So, time is ripe, we would claim, for IS

research to reach beyond design of fields for database input, and take up the challenges of present and future interaction technology. These challenges are furthered by related multimedia development that will be discussed in the following.

#### *From PC to Fridge: Ubiquitous multimedia*

At a conceptual level, a paradigm shift is needed to accommodate for how computer applications are used today. At work and at home we surround ourselves with multiple computer artifacts that are perhaps marginally, and we use our PC for a multitude of applications, none of which are hierarchically organised, neither are they designed from the bottom up, independent of other applications and artifacts. E.g. to call the average 10-15 small display applications, that most people (Kuutti 1998) have in their home, 15 systems, or ONE system makes little sense. A concept to substitute information systems that can encompass this over-layered multitude of multi-purpose tools, media and systems, is in our perspective necessary to better understand the "clay of computing" of the future, and to work towards design methods needed to work with this multitude of technologies.

#### *From Information Systems to Intranets*

Within work, the extent of the possible use of multimedia technologies is far from clear. At the "down to earth" end of things, multimedia product catalogues along with an array of web services are emerging, and cheap desktop video-conferencing has become everyday artifacts of a large number of settings. In most enterprises there has been an enormous investment in establishing Intranets which

provide company wide access to important information. The establishing of Intranets has many different implications for enterprises depending on the organisational culture. Trends are that traditional vertical Information Systems become more widely available in the companies and that more people get access to information across the organisational hierarchies as new horizontal communication and collaboration channels appear (Bansler *et al.* 1999). Companies open up for a more pluralistic information system approach, where many employees are educated in publishing information on the Intranet, and new information sources useful to parts of the company grow without management control. Finally aesthetics become a design parameter for company information system as a lot of effort is put into making the Intranet attractive to use. Thus, information system designers get new roles and are confronted with new competence requirements. Providing flexible Intranet infrastructures that allow employees to develop their own information sources will become a must, and new players who can make information sources aesthetically attractive will appear on the scene.

#### *From Virtual Reality to Augmented Reality*

From being entertainment only for some years, virtual reality technologies have become an important technology for industries needing visualisation and simulation of products. This move has been helped by the substitution of individual helmet interfaces by projection based interface, where many users can be immersed and share their views and experiences in 3D worlds. These interfaces al-

low for a mixture of virtual and real objects in mixed or augmented reality. Industrial designers may, e.g. be able to work with a mixture of foam/wood models and 3D projections on a HoloBench or in a VR-cube.<sup>3</sup>

Examples of the more advanced kinds of augmented reality that are hitting our workplaces are advanced training facilities using multimedia, full-scale simulation of ship bridges (Bøgh Andersen, in press), and mixed reality distributed design rooms for industrial designers. In both cases real physical devices such as controllers and various foam and wood models are augmented with projected 3D images.

#### *From Office to Home: Converging Technologies*

Multimedia is spreading from office to public space and to the home. In the homes, multimedia enters through video-on-demand servers, Internet access in the living room, e.g. combined with TV-sets (Skouby & Tadayoni 1999). Family browsing of everything from TV programs to holiday resorts and dictionaries of various sorts together in the living room, seriously challenges our present understanding of what browsing might mean: what to find and how to browse. A wide array of applications can be imagined when also washing machines, heating devices and microwave ovens get their Internet address.

*Qua* citizens' access to Internet etc., new challenges are e.g. to provide access to information about local government services, which are not structured according to traditional bureaucratic structures, but to the needs to the general public, diverse and ill defined as these may be (Kaasgaard *et al.* 1999).

Designing for home and public purposes poses severe challenges to Scandinavian system design tradition, be they participatory or not, by moving design out of work settings. At one level, system design has inherited from management theory etc. a concern for efficiency, automation etc. that does not go down just as well when it comes to leisure. Designers have access to these users partly because they are in a well-defined work. The "new" users are people in their own homes, who buy and use products for fun, and not because they have to for some management reason. This means a breakdown of our practical ways of working, of identifying users to work with, delimiting the scope of design concerns etc. E.g. the BIDI project, along with e.g. O'Brien *et al.* (1997) have been concerned with how to do field work as part of design in people's homes. We have focused on a number of practical and concerns regarding observation and videotaping of use, perhaps only minutes a day, in intimate home situations e.g. when people turn on and off their radio or the coffee maker in the morning.

#### *Designing for work versus designing for entertainment*

Much multi-media design is seen as art rather than as a traditional computer application or tool, and thus needs to be seen and judged in this light, or perhaps in this light as well as those that we most often attribute to computer applications, e.g. efficiency, or transparency. We find that the primary challenge here is how *not* to throw the baby out with the bath water, i.e., to invite aesthetical concerns into design, but not to let those dominate design entirely. This challenge can be illustrated by the following:

Where, e.g. in the BIDI project, the classical concern for usability has come out of ergonomics and cognitive psychology, industrial design has mainly been concerned with aesthetics. Whereas we recognise that aesthetics is very important when it comes to multimedia design, we find it an equally important challenge for design in such settings to work towards a wider conception of usability that moves beyond aesthetics and classical psychological and engineering approaches to usability. Usability in our understanding, need to be concerned with ways of working that stress the usefulness as well as "look-and-feel" of products in real use settings. This means that multimedia design in general must seek to establish a meeting place for the various assumptions about and concerns for technology emerging from the different disciplines. This directly contradicts the image of the designer as independent, creative artist, who "know best" what the design is going to be. And we certainly have problems with insisting on classical systems development approaches. The BIDI project experiments with providing physical settings, collaborative ways of working and shared representations for interdisciplinary teams of designers. In the participatory design tradition, which is our background, we have insisted widely that users need hands-on experiences in order to participate actively in design. In our opinion these teams should, and can involve users, and thus leave a role to participatory design. These teams should be able to handle contrasts, contradictions and a multitude of perspectives, and as such provide a creative field of tensions for the creative designers.

### **A Scandinavian approach to multimedia?**

As discussed in the introduction, multimedia design has, thus far, mainly been a concern of individuals who invent gadgets. User needs, or usability of the product in a general sense has been of little concern as has issues pertaining to design method. As pointed out by Koistinen (in preparation) most multimedia design projects are carried out as small pieces of arts and craft work, despite the expansion of the industry that makes multi-media design resemble mass production. In our analysis, multi-media design has currently reached the stage that in many ways resemble that of software development in the late 1970'ies. Hopefully, the IS community can help provide insights into e.g. project management that can make the transition happen less painfully than in software development.

We find the Scandinavian IS tradition has something to add through a focus on co-operation in interdisciplinary design teams. Such co-operation is both a matter of the ways and means that a group of people with different competencies need for collaborating. It is further a matter of how interdisciplinarity is carried through in projects: the multimedia education set up is a starting point for educating designers that themselves have multi-disciplinary competencies. On top of that it is still necessary to work towards ways of working that allow for creative confrontation of the many voices of the involved design competencies. In our perspective, the need is not so much structured design methods as is experimenting with representations, storyboards, mock-ups and design rooms that will help facilitate such co-operation.

A particular voice that the Scandinavian research has a tradition of raising is that (or those) of the users. Design of multimedia products adds to Grudin's (1993) concern over user participation in product design the severe question of user participation in creative art work. At one level we fear that the neglect of this concern in multimedia design is based on as bad excuses as in much practical systems design in general. Yet we need to work towards convincing examples showing that raising the voice of the users is an equally interesting challenge for multimedia designers as it is for designers in other areas. There is certainly also the risk that we never reach an appropriate understanding of the material that we work with, in terms of the multiple media, the advanced interaction possibilities, and conceptually, which will in the long term make it difficult to create *useful* applications of multimedia technology. We find it unlikely that these technologies will survive unless somebody makes a serious effort to transform the gadgets into useful artifacts determined for human use. In that case, there is certainly a big risk that multimedia is a fad that will soon be forgotten. IS design has been very little prepared for these kinds of technological challenges, and in our perspective this challenge must be taken up now.

In our educational efforts within multimedia at Aarhus<sup>4</sup>, we find that it is necessary to work towards such a richer understanding of the material that we work with. This means to:

- bridge between the aesthetical and the usability side of artifacts,
- to experiment with participatory strategies for design of a large

number of multimedia applications for the home, the public as well as for work, and

- apply a wide array of technologies such as portable devices, ubiquitous technologies and virtual reality worlds.

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### Notes

<sup>1</sup><http://www.media.mit.edu>.

<sup>2</sup><http://www.intermedia.uni.dk>.

<sup>3</sup><http://www.tan.de>.

<sup>4</sup><http://www.multimedia.au.dk>.

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