Flirting with the future : prototyped visions by the next generation

Flirting with the Future

Proceedings of the fifth **Student Interaction Design Research** Conference

April 15-17, 2009
Eindhoven, the Netherlands

Editors:
_I.H.C. Wouters
_F.P.F. Kimman
_R. Tieben
_S.A.M Offermans
_H.A.H. Nagtzaam

Flirting Conference

SIDeR'09

Proceedings of

Flirting with the Future

Prototyped visions by the next generation

SIDeR `09

Fifth Student Interaction Design Research Conference
15-17 April 2009
Eindhoven University of Technology
The Netherlands

Edited by

Ivo Wouters
Floris Kimman
Rob Tieben
Serge Offermans
Hugo Nagtzaam

Flirting with the Future - Prototyped Visions by the Next Generation

Proceedings of the Fifth Student Interaction Design Research Conference (SIDeR '09)
Eindhoven University of Technology, April 15-17 2009.

Editors:
Ivo Wouters, Floris Kimman, Rob Tieben, Serge Offermans, Hugo Nagtzaam

Cover Design:
Floris Kimman

Printed in The Netherlands 2009

A catalogue record is available from the Eindhoven University of Technology Library

ISBN: 978-90-386-1761-9

universiteitsfonds eindhoven

IOP

premsela.org/

Design Connection Brainport

TU/e Technische Universiteit Eindhoven University of Technology

/ Industrial Design

Foreword

Seduce them. That is what we asked from our students at TU/e who wanted to organise the fifth Student Interaction Design Research (SIDeR) conference for the community of interaction designers. Seduce them. Entice the current generation of interaction design researchers both in academia and industry to astray from what they think is the right behavior in interaction design research.

SIDeR'09 is a conference by and for the next generation of interaction designers. The themes and topics are defined in the language of the next generation and focus on their motivations and inspirations. It is a conference organised by the future for the future. This is the way to challenge the current status quo of research and industry. It seems easy to critique current frameworks of interaction or complain about how current products do not respect the user, but the best critiques and complaints are those that are complemented with something different, something better, something more beautiful.

In our work as educators of interaction design students we see that our fellow researchers, our industrial clients and we are attracted by the fresh approach students demonstrate. They have an original vision on the opportunities of future technology for today's users. They propose a fresh vision on what today's users want from future technology. These visions are not just embodied in words or images. The current generation of students has the skills to prototype these visions to the level where they can be experienced, valued and validated. It is these prototyped visions that entice our generation to astray from what we thought was the right behavior.

We would like to thank the previous organisers in Sønderborg, Denmark (2005, 2008), Ronneby, Sweden (2007) and Göteborg, Sweden (2006) for starting the SIDeR conference. We thank them for entrusting us with this mission. Furthermore, we fully acknowledge the current generation of designer/researchers for their constructive reviewing of the flirtations.

Stephan Wensveen and Kees Overbeeke
Eindhoven, April 2009

Contents

About SIDeR

The fifth Student Interaction Design Research (SIDeR) conference 2009 is hosted in Eindhoven, the Netherlands. The conference enables students to participate in and contribute to the emerging discipline of designing (for) interaction. Students (especially: graduate and post-graduate students) are invited to challenge the state of art of the current design world by submitting their 'interactions'.

SIDeR generates a dialogue between students with different educational and cultural backgrounds; enabling them to expand their horizon, share perspectives on design and critically evaluate the future trends.

The SIDeR conference is a three day event, with a mixture of keynote lectures, interaction presentations, demonstrations, workshops, interactive sessions and social events.

Workshop sessions are an important part of the conference as well: small groups of people work together while creating interactive systems. This encourages coherence, discussion and cooperation, while increasing the understanding of different stages of the design process from different perspectives.

Background of SIDeR

This is the fifth Student Interaction Design Research (SIDeR) conference. This conference series was inaugurated in 2005 in Sønderborg as a means of enabling interaction design students to participate in and contribute to research in the emerging discipline of interaction design. It has since been hosted by Chalmers University of Technology in Göteborg (2006), Blekinge Institute of Technology in Ronneby (2007) and Mads Clausen Institute in Sønderborg (2008).

SIDeR05 in Sønderborg - http://www.it-products.sdu.dk/designresearch/

SIDeR06 in Göteborg - http://www.cs.chalmers.se/idc/sider06/

SIDeR07 in Ronneby - http://www.akademisydost.se/tek/sider07.nsf/

SIDeR08 in Sønderborg - http://www.it-products.sdu.dk/events/sider08/

SIDeR09 in Eindhoven – http://www.sider09.com

Flirting with the Future
Prototyped Visions by the Next Generation

We, humans, interact. We interact with other people, we respond to stimuli, and we adapt our behaviour to each other. We also interact with our environment: with the ground, the trees, and everything around us. Since long, some people have been changing existing objects into products: products that people can use, that make a task easier, that help them. People's movements, and thus their behaviour, have been influenced by these products: the affordance of a chair, or the required actions for driving a car, they both guide the movements of the user.
In a way, we, as designers, have designed the users their movements: through our products, we have designed the interaction that is required with these products.

This traditional process, of determining the fixed behaviour on forehand, has ended. Products nowadays start to influence the behaviour they elicit: products adapt themselves to their environment, instead of waiting for users to change them. Products even start behaving for themselves, interacting with us, their environment, and with other products. What can and should we, as designers, decide and design about that?

Besides this, products are transforming into platforms. Take modern mobile phones as an example: the physical phone is only the first step; the real use and experience is created by the content and the services. How does one design such intangible experiences?

We often see our products as guides for people's movements, through affordances, feed-forward and feed-back. Can we really design users their movements? Are we not creating patterns of required movements, that we force the user to follow?

Additionally, recent products can no longer be totally finished by us designers. Community-based design, open-source, but also simply content-sharing creates the experience of a product, just as much as the original design does.

Finally, if we forget the question about what to design regarding these new products, we can ask ourselves 'how'. We clearly can no longer design with just pencils and paper. What tools do we need then? Who creates these tools, and how does one learn and master them? How do these tools influence the future products?

All these questions have to be answered in the very near future. This is impossible to do in just words: prototypes, experiences and visions are necessary. We need to interact: with our users, with our products, with each other, and with the world.

SIDeR09 is about this interaction: this vision on the future, experienced and evaluated by the next generation of designers.
We challenge you, the designer of the future, to interact. We invite you,
to Flirt with the Future!

Rob Tieben
Ivo Wouters
Hugo Nagtzaam
Floris Kimman
Serge Offermans

Committees

Program Committee / Reviewers

Prof. Dr. Ir. A.C. Brombacher, Eindhoven University of Technology (Netherlands)

Dr. Ir. C.H. Dorst, University of Technology, Sydney (Australia)

Prof. Dr. Ir. J.H. Eggen, Eindhoven University of Technology (Netherlands)

Frank Feltham, RMIT University (Australia)

Ir. E. Karapanos, Eindhoven University of Technology (Netherlands)

Dr. Ir. I. Keller, For Inspiration Only (Netherlands)

Prof. Dr. Ir. J.B.O.S. Martens, Eindhoven University of Technology (Netherlands)

A. al Mahmud, PDEng, Eindhoven University of Technology (Netherlands)

Drs. A.J. Matysiak, Eindhoven University of Technology (Netherlands)

Ir. Philip Mendels, Eindhoven University of Technology (Netherlands)

Ir. K.M. van Mensvoort, Eindhoven University of Technology (Netherlands)

A. S. Mery Keitel, University of Technology, Sydney (Australia)

Drs. C.J.H. Nieuwenhuizen, Eindhoven University of Technology (Netherlands)

Prof. Dr. C.J. Overbeeke, Eindhoven University of Technology (Netherlands)

Dr. O.V. Schimmel, Eindhoven University of Technology (Netherlands)

Drs. R.J.W. Sluis-Thiescheffer, Eindhoven University of Technology (Netherlands)

Ir. I.A.C. Soute, Eindhoven University of Technology (Netherlands)

Dr. Ir. S.A.G. Wensveen, Eindhoven University of Technology (Netherlands)

Organisers

SIDeR '09 is organised by Stichting Activiteiten Lucid, which is related to Study Association Industrial Design Lucid, department of Industrial Design, Eindhoven University of Technology. This organisation aims to provide students with educational activities that matter.

Organisation Committee

Rob Tieben, Eindhoven University of Technology (Netherlands)

Ivo Wouters, Eindhoven University of Technology (Netherlands)

Hugo Nagtzaam, Eindhoven University of Technology (Netherlands)

Floris Kimman, Eindhoven University of Technology (Netherlands)

Serge Offermans, Eindhoven University of Technology (Netherlands)

Conference Chairs

Prof. Dr. Ir. A.C. Brombacher, Eindhoven University of Technology (Netherlands)

Dr. Ir. C.H. Dorst, University of Technology, Sydney (Australia)

Prof. Dr. Ir. J.H. Eggen, Eindhoven University of Technology (Netherlands)

Prof. Dr. Ir. J.B.O.S. Martens, Eindhoven University of Technology (Netherlands)

Prof. Dr. C.J. Overbeeke, Eindhoven University of Technology (Netherlands)

Dr. Ir. S.A.G. Wensveen, Eindhoven University of Technology (Netherlands)

Flirting with the Future

Prototyped visions by the next generation

Keynote Speakers

Tobie Kerridge

Tobie is a researcher and PhD candidate at Goldsmiths University and a visiting Lecturer at the Royal College of Art. His research explores how design methods can be extended to provide individuals with creative ownership of technology. His thesis reflects upon the novel contributions of speculative design as a method for public engagement with science and technology.

His keynote is about one of his research projects: Material Beliefs. This project takes emerging biomedical and cybernetic technology out of labs and into public spaces. The project focuses on technologies which blur the boundaries between our bodies and materials, and how design as a tool for public engagement can be used to stimulate discussion about the value of these forms of hybridity.

www.tobiekerridge.co.uk - www.materialbeliefs.com

Marianne Graves Petersen

Marianne Graves Petersen is associate professor at the Computer Science Department at the University of Århus in Denmark. In addition, she is project manager of a number of projects conducting research into future homes. She is interested in pushing the limits of interaction design all the time with a focus on designing to improve the quality of life of people. Throughout her research career she has worked in close collaboration with industrial partners such as Bang & Olufsen and Danfoss. Recently she received an award from Microsoft Research in Cambridge funding research into ways of Supporting Playful Experiences in Everyday Life at Home. In addition, she works as an independent consultant advising companies on innovation, user experience, user-centered design and interaction design.

Her talk 'Pushing the Limits of Interaction Design' discusses how interactive technology is becoming an integral part of more and more aspects of our everyday life. We stage ourselves through the technology we use, we flirt through technology, we live with and through technology in many ways. We spend endless hours in settings shaped by interaction designers. As interaction designers we heavily influence the conditions of work, home life, creativity and flirt - how do we take on this responsibility now and in the future?

http://www.daimi.au.dk/~mgraves/

Peter-Paul Verbeek

Peter-Paul Verbeek (1970) is professor of philosophy of technology at the Department of Philosophy, University of Twente, Enschede, The Netherlands, and director of the international master program Philosophy of Science, Technology and Society. He is also an editor of the journal Technè: Research in Philosophy and Technology and a member of the board of the Society for Philosophy and Technology. As from 2009, Verbeek is a member of the 'Young Academy', which is part of the Royal Netherlands Academy of Arts and Sciences.

Verbeeks research focuses on the social and cultural roles of technology and the ethical and anthropological aspects of human-technology relations. He recently published the book What Things Do: Philosophical Reflections on Technology, Agency, and Design (Penn State University Press, 2005), in which he elaborates an analysis of how technologies mediate human actions and experiences, with applications to industrial design. He also co-edited the volume User Behavior and Technology Design – Shaping Sustainable Relations between Consumers and Technologies (Springer, 2006) about the interaction between technology and behaviour, and its relevance to technology design and environmental policy (utwente.nl).

His talk is about 'Moralizing Technology: Understanding and Designing the Morality of Things'; which will also be the title of his latest book that he is finishing at this moment.

Flirting with the Future

Prototyped visions by the next generation

Interactions

Interactive Persepolis: A Study on Role of Interaction Design in Cultural Heritage Tourism

Mahmoud Keshavarz, Ali Dehghanpour, Mahsa Ranjbarian
VIXD: Virtual Institute of Interaction Design
+98 917 716 0471
{m.keshavarz, dali, m.ranjbarian}@vixd.org
www.vixd.org

Abstract
Interactive Persepolis is an interactive tourism information system (TIS) for the Persepolis historical site, based on a "location-aware system." Interactive Persepolis interprets information through involving tourist experiences. There is a missing connection between cultural heritage tourism planners and information technologists for designing a state of the art interactive TIS. One role of interaction design is to develop usable and meaningful information systems. We connect these two fields by applying interaction design factors to reach a design process. Finally we present an example based on the extracted process and evaluate it with an imaginary personae.

Keywords
Cultural heritage tourism, interpretive planning, tourism information system, user experience

Abbreviations
TIS: Tourism Information System
IxD: Interaction Design
CH: Cultural Heritage
VR: Virtual Reality
AR: Augmented Reality
LBS: Location Based System
HDM: Head Mounted Display
UX: User Experience;

Introduction
There is a gap between cultural heritage tourism planners and information technologists. Tourism managers and planers and information technologist working in the field of interpretive planning separately, use their own method of transferring information to tourists regardless of other possible ways. According to the "National Trust for Historic Preservation Organization", cultural heritage tourism is: "Traveling to experience the places, artifacts and activities that authentically represent the stories and people of the past and present, it includes cultural, historic and natural resources."[1] By this definition the most important thing to cultural heritage tourists is "experience," and interaction design is the most suitable solution for designing experiences for cultural heritage tourists. We try to connect TIS and IT and depict a process for designing an interactive tourism information system. This process focuses on user experiences as a main structure for technology users and also interpretive planning as a main structure of cultural heritage tourism. By means of our process we can develop cultural heritage tourism throughinclusive, state-of-the-art designs and systems.

Role of IxD in Cultural Heritage Tourism
One of the most important factors for attracting tourists to countries with rich cultural heritages is providing various ways of presenting and interpreting information about museums, heritage sites or special places. Using IxD principles and factors will help to transform cultural heritage data into easily understood, tangible and memorable information for tourists.

Interpretive Planning
The planning of information interpretation is called interpretive planning in the tourism industry and according to studies in thisfield: "To attract visitors, the experience that you offer must be compelling and should engage the visitor's five senses as much as possible."[1]

Studies have shown that visitors remember:
- 10% of what they hear
- 30% of what they read
- 50% of what they see
- 90% of what they do

Today's travelers are looking for experiences that
• Engage all five senses: at a minimum, these experiences provide opportunities for visitors to ask questions and make comments about their own knowledge and experiences.
• Reveal what happens "behind the scenes": who is the artist, and how do they create their art?
• Relate to their own personal experiences: when experiencing historic homes or areas, how does this compare to the ways we live today?
• Relate to a larger historical context: how does a heritage experience fit into the larger context of local, regional or even national history?

John Veverka in his book "Interpretive Master Planning" mentions this definition of interpretation:
"Interpretation is a communication process, designed to reveal meanings and relationships of our cultural and natural heritage, through involvement with objects, artifacts, landscapes and sites." It continues: "It should be stressed that interpretive communications is not simply presenting information, but a specific communication strategy that is used to translate that information for people, fromthe technical language of the expert, to the everyday language of the visitor."[6] If we want to see the interpretation process as a system, we should consider some issues which are similar across design processes, like whom are we interpreting for? What are we interpreting? What messages do we want to communicate? What are our specific objects? What media will we use and how will it be evaluated?

In: Wouters, I.H.C.; Tieben, R; Kimman, F.P.F.; Offermans, S.A.M. and Nagtzaam, H.A.H. (Eds.)
'Flirting with the Future', Proceedings of SIDeR '09, April 15-17 2009, Eindhoven University of Technology, the Netherlands.

Tourism Information System (TIS)

"Tourism information system is a collection of knowledge and data about attractive destination."[2] Based on this definition, TIS is involved with methods of receiving information about a specific place in official or non-official ways. TIS is a tool for transmitting information about a historical site to visitors. Our focus is on transmitting the information to visitors in such a way that they also participate in it interactively.

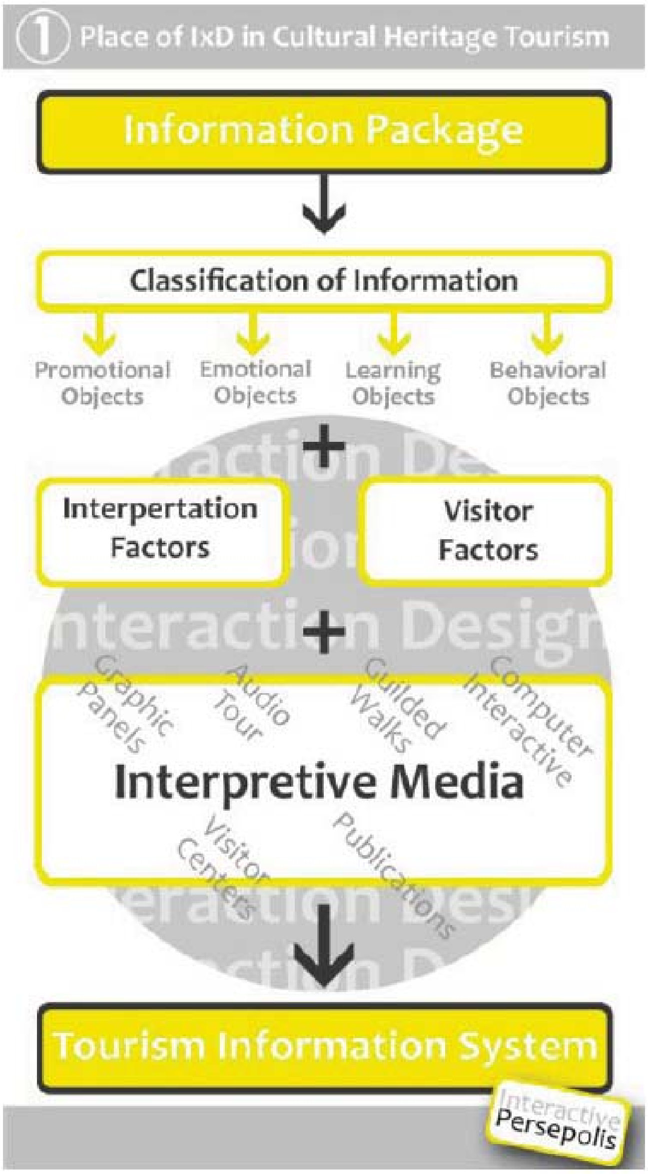

Figure 1. Role of IxD in cultural heritage tourism

Current view

Developing new technologies has brought new possibilities to challenge the implementation of innovative interactive systems to promote the relationship between technology, culture, heritage and the public. Emerging technological concepts like ubiquitous computing, micro geography and augmented reality offer a brand new approach to cultural institutions in general, museums, monuments and heritage sites in particular. These systems enable visitors to access contextual information offering multimedia content to the public that can now have a more personal and customized visit.[5] These technologies are "virtual reality" (VR), augmented reality (AR); location based systems (LBS), location aware systems, head-mounted displays (HDM) GIS, GPS and Wi-Fi.

Design Methodology

In this section, the focus is on defining a process based on user experience (UX) and interpretive planning principles.The main process structure is based on the authors' design-centered approach to bridge the gap between interpretive planning and IxD; some similarities to other processes which are currently used by IxD designers are expected. There were four steps to the development process:

- Investigation: our main structure process was inspired by IDEO's ten step design process.[4]
- Assimilation: applying interpretive planning and UX principles to extract the existing overlaps
- Reviewing the previous steps.
- Finalization: depicting the project via workflows and digrams.

Our design process is shaped to meet the requirements of an interactive TIS project and includes the following steps:

Data package

Gathering and collecting the information is the first and main step in any process.The information package is a term we use for all project inputs as follows: site information, client requirements, users' information and statistics.

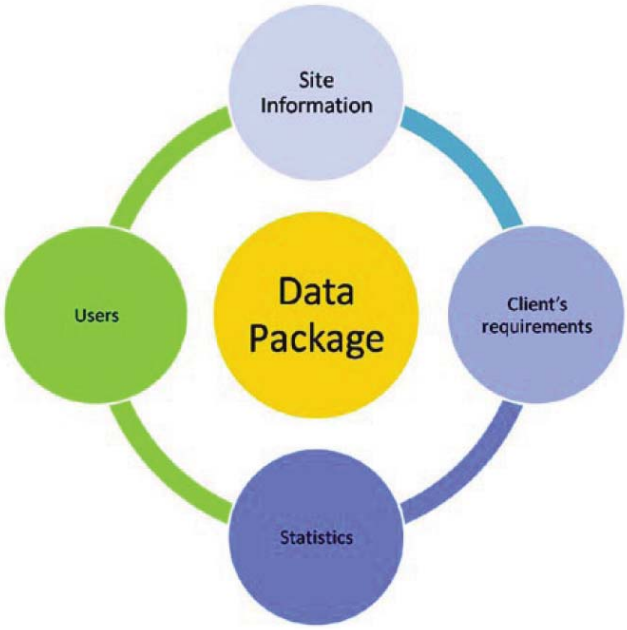

Figure 2. data package parts

Analyzing

Main activities of this section are studying and categorizing the information package, highlighting the important parts, finding the gaps and filling them

Transforming into design language

Converting multidisciplinary information (historical information, cultural heritage management concerns, interpretive planning factors, etc) into a design language will help the design team to come up with a better understanding of project requirements.

Classification
The next step is classifying our outputs based on four interpretive objectives, emotional objects (E.O), promotional objects (P.O), learning objects (L.O) and behavioral objects (B.O).
- Emotional objects: what you want your visitors to feel.
- Promotional objects: how you want to present your organization.
- Learning objects: what you want your visitors to know.
- Behavioral objects: what you want your visitors to do.

Conception
As with any other design process, conception is the beginning of synthesizing information by the design team. In fact, conception is an idea generation stage which can contain ideas in a variety of formats.

Envisioning
By envisioning we materialized the ideas. Ideas are like dreams until they are visualized into some concrete representation. The representation can be any sort of description of the design, whether visual or behavioral, or a combination. [4]

Selection
Now it's time to choose. We have a number of concepts with various advantages and disadvantages; we select those concepts that are close to our former framework.

Prototyping
Here we are going to realize the selected visual concepts by making prototypes. Prototypes are practical models that we use for testing usage.

User testing
As our approach was highly dependent upon the quality of the specific user experience, we incorporated significant user feedback in our prototype design process. In addition, for assessing the tangible interaction abilities of the prototype, we tested over the full range of human sensory perception.

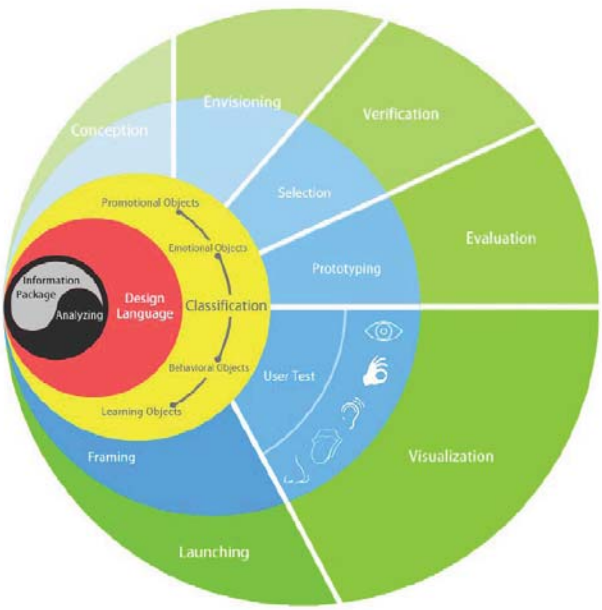

Figure 3. Extracetd interaction design process for TIS

Framing
Framing focuses on addressing tangible interactions for applying the most effective connection between the user and the interface, and increasing the ability to remember site information. The most effective way to remember information sorted by priority can be portrayed as:
Do > See > Read > Hear

Verification
To confirm that design results match client requests, we present the document and visual results to clients. Clients may offer feedback about the extracted result and the designs which best fit their needs. We now move to finalizing the concepts.

Evaluation
By reviewing and criticizing all the project outputs, we can sort them in an organized process. Then, using key criteria which are obtained in this section, our process comes near to the final steps. This is called evaluation.

Visualization
After we have shaped the design scheme, we should finalize the design by detail designing. This can be achieved through technical design, 3D modeling, etc.

Launching
Preparing and motivating the market to accept the final designed or redesigned system is the final step of the process, and is called Launching.

Interactive Persepolis

Site information
Persepolis located in 57 km north-east of Shiraz, Iran. About 518 B.C, Darius the Great (522-486 B.C.), who ruled over a world empire with solid cultural institutions and containing many of the civilized nations of the ancient world, decided to found Persepolis in the heart of his empire, to serve as a symbol of his power and also as a magnificent setting for celebrating the great national and religious festival of "Nowruz" ("New Year's Day"), which normally coincided with the Spring equinox (around 21st March).

Problem definition
One of the most important principles of interpretive planning of cultural heritage tourism is to provide the visitors with compiled and accessible information.Despite the different methods to inform CH visitors around the globe, still there is a need for an interactive system that can transfer the information to them through their own experiences.There is also a need to offer an interactive information system for Persepolis. Currently information is transferred by info stands, brochures and tour guides, but they cannot satisfy the visitors of the site. Considering this deficiency and the author's personal experience and knowledge about the site, we have found a good potential for offering an appropriate solution to promote the current situation through our predefined process.

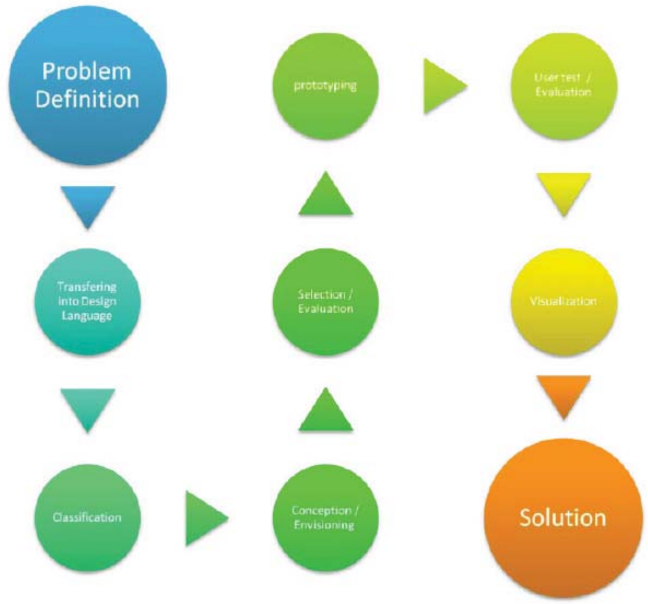

Figure 3. Extracted interaction design process for TIS

Design solution (More in Explanation File)
To give tourists a unique experience in their visits we designed a package which consists of a smart T-shirt as a gift and a portable device which will guide them through their visits in “Persepolis”.

Smart T-Shirt
The T-shirt is an interactive medium, with the site map on it and the ability to record the path which a user passed by in his visit using O-LED and GPS technology. Therefore he can remember his journey to Persepolis. He can also show his friends the path that he went through during his visit and explain to them his personal experiences.

Persepolis Device
The portable device is an intelligent guide which can help, inform, entertain and interact with the user during his visit. It is a multifunctional guide helping the user to be interactively informed using “progressive disclosure”. “Progressive disclosure” is a strategy for managing information complexity in which only necessary and requested information is displayed at any time given by separating information into multiplies layers and only presenting the layers that are relevant or necessary.” [3]

Conclusion

The device we have designed is quite innovative, and encourages tourists to have their own personal experience at the Persepolis historical site. Based on our research during this project we consider there to be vast potential for working on similar projects on Iranian historical sites. It can be developed through future technologies and is offering more tangible experiences. For future work we suggest more detailed focus on involving user experience by engaging their five senses.

Acknowledgment

We would like to appreciate Mr. Jason Stiffler, MA, English, Calpoly University, 1996, Adjunct instructor of composition, pcc, and Ms. Samira Ranjbarian for all of their helps through correcting this paper.

References

[1] Cultural Heritage Tourism Principles, available at www.preservationantion.org

[2] Farajzadeh Asl, Manouchehr, Georaphical Information System and Tourism Planning, SAMT Pub., Teran, 2005

[3] Lidwell, William, Holden, Kritina, Butlez, Jill, Uni versal Principles of Design, Rockport, 2003

[4] Moggridge, Bill, Designing Interactions, MIT Press, Cambridge, 2007

[5] Valinho, P. Cerbderia, C. Franco, I. Serras, B. Interac tive and real-time interpretation: New boundaries for Cultural Heritage, the 7th international symposium virtual reality, archaeology and cultural heritage. VAST 2006

[6] Veverka, John A. Interpretive Master Planning, Acorn Naturalists, CA, 1997

[7] Zoellner, N. Stricker, D. Bleser, G. Pastarmov, Y. iT-ACITUS- Novel interaction and Tracking

This paper is the design argument of a submission to the SIDeR ‘09 Conference. The full submission, including an elaborate explanation can be found on www.sider09.com

Intelligent Interaction

AMER OTHMAN, ALI MAHMOOD KHAN, FADEL ALHURAINI, GAURAV SHARMA, GERO MUDERSBACH, MAHMOUD AWAD, SAMER AL SAYAH, USMAN MASOOD
Embodied interaction, Digital Media, University of Bremen, Germany
embodiedinteraction@googlemail.com

Abstract
Interaction with computers is in most cases predefined. Computer systems are not learning and thus are not adapting to situations. As a result the effectiveness of today's interaction interfaces is limited, users are often not enabled to optimize work flow, or even worse, tasks cannot be accomplished at all. By the lack of contextual understanding of the underlying system, the elements of interfaces become generalized, so they fit in as many situations as possible. This again leads to confusion on the user side and results in a longer learning curve. Simply stated, an adaptive system lets the user concentrate on the task and finally the clutter of interfaces vanishes. In building adaptive system, we face different problems. The key problem of making an intelligent application is: how will the application evaluate the situation? How will it choose the best action? To solve these questions, and to find out more about how "natural" interaction between humans and machines happens, we built the intelligent room. Before the actual implementation of a learning system started, we decided to test our assumptions with a faked system. By this we came to the conclusion that many methods can be used to interact between humans and computers and second that learning by a system can help the user accomplish the tasks.

Keywords
intelligent room, machine learning, adaptive system, human computer interaction.

Research question
How can an adaptive system improve interaction between humans and computers?

To whom is it relevant
The intelligent room example is used as a proof of concept. An intelligent application that adapts the computer's behavior to the context can be relevant for everyday life. As a result an implementation of these concepts could run on modern cell phones or PDA's, which have sensors like accelerometer and GPS. These devices would adapt their behavior according to the context of its environment.

Despite numerous projects [1,2,3] in the domain of intelligent rooms, interaction in the living room has not changed significantly, since the invention of the remote control. If successful, our work could help taking the domain to the next level.

Evaluation and implementation

How do humans interact with systems that claims to be intelligent

In the field of human-computer interaction, a Wizard of Oz experiment is a research experiment in which subjects interact with a computer system that subjects believe to be autonomous, but which is actually being operated or partially operated by an unseen human being [4].

In our case the Wizard of Oz aims to find the best relationship between user movements and the system. The results help modeling the system's behavior. In our experiment we instructed the users to interact with the room as a master, considering the room as their slave.

The numbers of participants in the experiment were six. There were two 22 year old German students with a computer science background, a 25 year old Cameroonian student with an information technology background, a 22 years old German woman studying history, a 21 years old French women studying German language and a 40 year old teacher assistant.

Instructions for the experiment were provided in advance. The users were asked to play a simple game:
1. Projector is on standby. Please activate!
2. Follow the instructions on the presentation slide
3. Select any music track to play and relax
4. Maybe you would like to turn on the fan and refresh yourself
5. Thank you! Please turn off the lights and kindly leave the room

We then observed the spontaneous interaction between the users and the fake system. Our setup for a potential intelligent room contained a projector, a fan, a table, a chair, a lamp, speakers and a camera to record user's actions. The users had to fulfill simple tasks like playing music with a media player, scrolling up and down slides of a presentation, turning the projector on, turning the light on and off and turning the fan on and off. The users were informed that the system is capable of understanding what they want.

The analysis of the experiment gave new ideas to design the system. The experiment showed "dimension of movements" (distance to screen, movements of limbs, different gestures) that work easily and can be easily picked by users.

In: Wouters, I.H.C.; Tieben, R; Kimman, F.P.F.; Offermans, S.A.M. and Nagtzaam, H.A.H. (Eds.)
'Flirting with the Future', Proceedings of SIDeR '09, April 15-17 2009, Eindhoven University of Technology, the Netherlands.

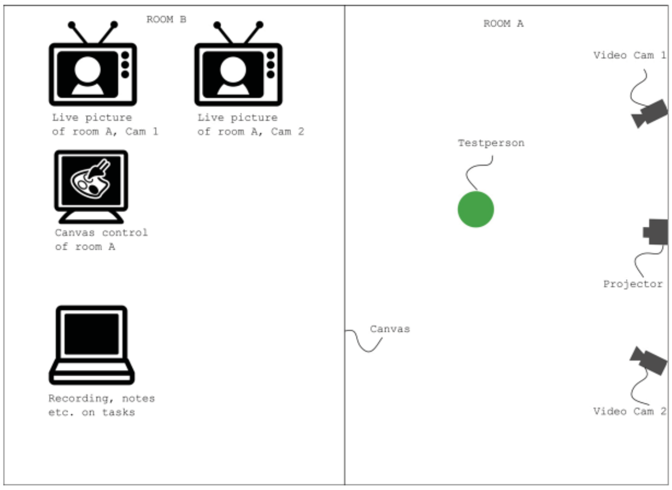

Figure 1

Observations:
• Free interaction of users with the system meaning users choose their own way of interaction. The user has not to give his attention to the interface. The user feels independent of the technology running in the background.
• Users provide natural language or other unscripted input to interact with the system.
• Some Users were uncomfortable doing hand gestures.
• If users are given the freedom to invent their own gestures, then they use complex and absurd gestures.
• Users expect system to be smart enough to take their feedback and implement it.
• Users became happy and satisfied if the system works smartly with minimum of effort from user.
• Users use mental model concepts to adapt to the new system.
• Users get surprised and confused if the system behaves automatically and it makes the user to think, how it happened?
• Computer science background people adapt easily to the system. Users who took time to adapt got frustrated.

How can feedback from the user be evaluated?
Modeling as system that adapts to people's changing usage patterns adds new interaction capabilities.

Our system consists of four main subsystems: action detection system, world model, critic system and actuation system. The subsystems when integrated, work as an intelligent system. The world model of our intelligent room basically consists of all possible states occurring in the environment along with associated actions and events which are likely to take place at each state in an period of time. Along with a critic system the world model is considered the core system of our intelligent environment. It generates all possible states and instances, along with the possible actions for every state. Being at a state "x", the user has a limited number of possible actions to take as well as possible events which will take place at that point. The feedback of the user is very important for the adaptive system.

Moreover, at each level, the system compares the set of actions at that state with the implemented action by the user and analyses which action should be taken for future simulations. In other words, the World Model has a method which calculates the distance between the current and the given state, and checks if the distance is reasonable, thus choosing the best reasonable action to be taken among the set of output actions provided by the world model. In addition, the world model connects with the critic system through an XML infrastructure; it calculates the reasonable states according to a given state (provided by the critic system), and informs the critic system about possible actions at this given state as well. The critic system assigns rewards for such actions and sends feedback to the world model which itself will update the set of actions specifying any new modification to the appropriate set of actions associated with the given state.

What are the parts of ou adaptive system?

As mentioned earlier our system is divided into different parts which integrate into a pluggable subsystem. Communication takes place with XML-formed messages. One part of the system reflects the current state of the environment, it is an instance of our surrounding world. To be able to catch changes in the environment the room has sensors built in that detect the actions of the user or variances of the setting like temperature and light level. As a result movements of the user from one part to another of the room, gestures (with the help of accelerometers) and other inputs are noticed by the action detection. The world model holds the current state of the environment and communicates with the critic system to enable rewarding of actions and to give a list of reasonable system actions as an input to the critic system. The main function of the critic system is to assign a value to each possible action computed by the world model. This value is based on a specific algorithm to select the best action to be taken among a set of actions. This selected action is then executed by the actuation system. This includes the facilities that enable the room to take actions like turning the projector on or off, switching the light or playing some music.

Conclusion

The architecture for the intelligent room has been designed. We are working on the integration of the four subsystems. Basic features of the intelligent room are working already. To improve our system, we have planned to test our system after each iteration of development. After each iteration, we would be doing the Wizard of Oz experiment, for testing our real subsystem and by faking only unfinished parts.

When ready, our system can be translated to other environments. One way to do this would be to built small instances of parts of the environment. This could be applied to mobile devices enabling adaptive and context aware systems.

Acknowledgement

Our project is a one year project of masters in digital media at the University of Bremen. We sincerely thank our project coordinators Rainer Malaka and Robert Porzel, who have helped us at every stage of the project. They helped us clear all our doubts and in increasing our knowledge to a higher level, by giving their valuable suggestions and inputs

References

[1] MIT Oxygen- [1]http://www.oxygen.lcs.mit.edu

[2] (last visited 30th january 2009)

[3] USYD-http://www.di.uniba.it/~ubium03quigley-6.pdf [1] (last visited 30th january 2009)

[4] University ETH-Ada-http://ada.ini.ethz.ch/presskit/papers/adaicra2003.pdf [1] (last visited 30th january 2009)

[5] Kelley, J.F., “CAL - A Natural Language program developed with the OZ Paradigm”: Implications for Supercomputing Systems. First International Confer ence on Supercomputing Systems (St. Petersburg, Florida, 16-20 December 1985), New York: ACM, pp. 238-248

This paper is the design argument of a submission to the SIDeR ‘09 Conference. The full submission, including an elaborate explanation can be found on www.sider09.com

Conductive Skin

by Becky Pilditch, Matt Johnson, Isabel Lizardi and Bibi Nelson,
Industrial Design Engineering, Royal Collage of Art, London
www.bareconductive.com
info@bareconductive.com

Background

In an era when life is increasingly regulated by gadgets and machines there is a drive towards the miniaturisation of electronics for the purpose of portability on and around the body. With modern technology there is no reason why the functionality of a mobile phone could not now be included on the surface of body. Current trends towards a post-desktop model of computer interaction suggests that information processing will become more integrated into everyday objects and activities.

The concept of printing electronics onto the body or using the skin as a substrate for transferring information, fits with this model. It would allow an individual to engage with computational devices and systems through gesture, movement and touch, in an intuitive fashion. It would also allow the creation of new methods of human-computer interaction and the augmenting of the body with new functionality.

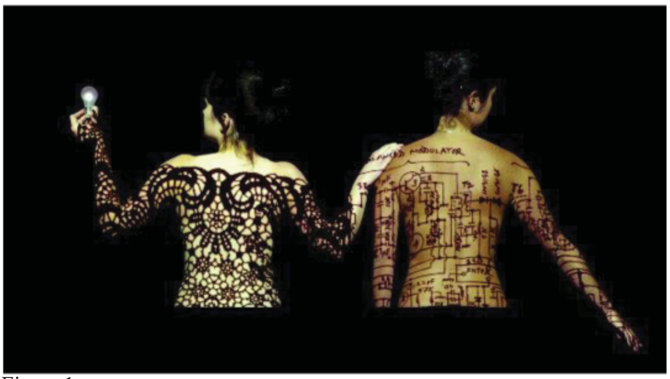

Figure 1

Description of Interactive System

Bare is a conductive ink that is applied directly onto the skin to bridge the gap between electronics and the body. It is the result of an experimental graduate project at the RCA, which started with the concept of 'Parasitic Technology'. The material allows users to create custom electronics and interact with technology through intuitive gesture. It also allows information to be sent on the surface of the skin from person to person or person to object. Bare is skin-safe and non-invasive. The formulation is carbon based and water-soluble and may be washed off the skin and reclaimed as a sustainable product. It may be applied in a number of ways including brushing on, stamping or spraying and has future potential for use with conventional printing processes on the body.

Through experimentation, the following potential application areas have been identified: dance, music, expression, computer interfaces, audio/visual communication and medical devices. Currently, skin-safe conductive ink is best suited to low power, information-lean applications. Throughout the project a series of experiments were conducted to explore the capability of the ink.

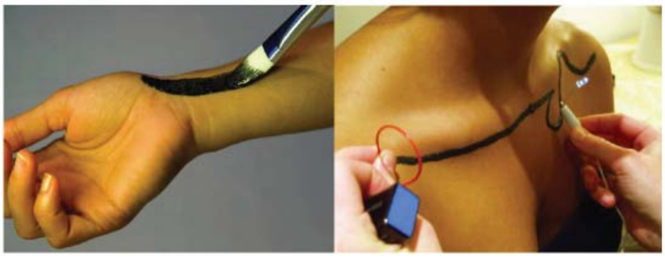

Figure 2

The video attached details one such demonstration, The Music Box, which involves combining sound and music with music and touch. This was a creative space constructed to test the conductive ink and interactions with the body. The functionality of a midi keyboard was mapped onto the surfaces of the space with a matrix of resistance switches that input signals to a computer. A professional dancer was invited to interactive with the space and the conductive ink was applied to different parts of her skin in an iterative process. As different parts of her body touched the surfaces different switches were closed as electrical signals passed over her skin, creating musical notes and patterns. The auditory and visual performance resulting from this 'reverse choreography' is emotionally captivating. It is anticipated that by covering larger surfaces and with the interaction of several dancers, more interesting cumulative effects may be established.

Figure 3

In: Wouters, I.H.C.; Tieben, R; Kimman, F.P.F.; Offermans, S.A.M. and Nagtzaam, H.A.H. (Eds.)
'Flirting with the Future', Proceedings of SIDeR '09, April 15-17 2009, Eindhoven University of Technology, the Netherlands.

Future Potential Applications

The ability to transfer data and electrical signals on the body provides some exciting opportunities for future product and interaction design. Some of the applications currently being investigated are as follows:

Communication: new way to access/ transfer data from person to person, person to computer or vice versa.

Security: affording access to restricted areas in the form of a temporary RFID stamp, for example, to create new form of passport or Oyster card.

Design for disability: as a sign language aid to provide 'sign' to voice translation by interfacing ink applied to hands with a computer.

Sustainable energy: harvesting human body power in conjunction with micro power-generators to provide energy to hand held electronics, eliminating batteries.

Medical: networking sensors onto the body for monitoring vitals.

Military: dematerialising devices onto the body in order allow soldiers to move more freely, for example antenna that can be painted on the body or buildings.

Fashion: a form of interactive body decoration using jewellery-type interfaces with the computer.

Non-skin applications: the ink may be applied to other surfaces to replace conventional wiring of building.

This paper is the design argument of a submission to the SIDeR '09 Conference. The full submission, including an elaborate explanation can be found on www.sider09.com

Virtual Challenges: A Social Interaction Approach to Increasing Physical Activity

André Fialho[1], Herjan van den Heuvel[1], Qonita Shahab[1], Qing Liu[1], Li Li[1], Privender Saini[2], Joyca Lacroix[2], Panos Markopoulos[3]
[1]User System Interaction, Stan Ackermans Institute, TU/e
[2]Philips Research Eindhoven, [3]Industrial Design, TU/e
{a.t.s.fialho, h.a.c.v.d.heuvel, l.li, q.liu, q.shahab}@tue.nl,
{privender.saini, joyca.lacroix}@philips.com
p.markopoulos@tue.nl

Introduction

Several studies indicate a growing increase in the number of people that are overweight. Along with psychological stigmas, these people have increased risk for heart diseases, high blood pressure, diabetes, arthritis-related disabilities, and some cancers [1]. Sedentary lifestyles and consumption of energy dense foods are the main factors leading to these conditions. A change in lifestyle through an increase of physical activity is commonly known to aid combating obesity. Additionally, regular physical activities reduce risks and provide therapeutic benefits for people that suffer from several health conditions.

Motivating an increase in physical activity is a known challenge, as there are several barriers that prevent people from having a healthier lifestyle. The use of persuasive technology has been proven effective in many cases. In the past, most studies relied on self-monitoring, by using, for example, diaries to asses people's physical activity level [2]. More recently, however, devices such as pedometers are used to unobtrusively measure physical activity [3]. In addition, we see that motivational strategies from psychology are employed, to increase persuasiveness of the intervention. In this area, a well-known approach is that of goal setting. These goals are usually determined by a system, and can be altered by the users themselves [4]. Goals can be individual or collaborative, in which each user must fulfill part of the goal. According to Weldon and Weingart [5], group goals motivate users to improve the personal performance, because they recognize that group success depends on the performance of the individual users, and because users tend to work together more effectively.

As group goals imply, persuasive systems can be built on top of social networks, so users can interact with each other. This allows for the benefits provided by social dynamics [6]. For our approach, we propose ActivityShare; a service application that combines selfawareness with social goal setting. We provide self-awareness to the user by unobtrusively measuring physical activity through a small accelerometer device, which measures movements in three dimensions. This device is the Philips Activity Monitor, which converts all movements into calorie expenditure. In line with the currently growing trend of sharing digital information, we propose a novel approach to goal setting: social goal setting. We enable users to share goals by proposing activity challenges to others. These challenges are posed to all users, and everyone is free to accept/ignore the challenges. Once accepted, the challenge becomes a new goal to achieve.

Initial Requirements

We performed an extensive literature survey on physical activity and persuasive technology. This led to an overview of existing technologies and solutions, pointing out their benefits and drawbacks. The overview inspired a rough concept. We employed a user-centered design approach to come to a final design. The design approach consisted of several iterations; we involved end-users in each iteration.

After the initial concept, we started with interviewing sedentary people about their current lifestyle and about their thoughts on our initial concept. The results of the interview led to a further specification of the concept. This concept was prototyped and put to the test in a real user environment. The results inspired a next iteration of the concept. At this point, we created a video prototype. This prototype was extensively discussed in a focus group. The results of the focus group were used to define the fully functional prototype, which we intend to use in a final user test. Below we describe each design iteration in detail. We report the method as well as a summary of the findings.

Initial Interviews

Initial interviews were conducted in order to make a first step towards people with sedentary lifestyles. The interviews addressed their opinions about their physical activities and our initial concept. All participants (n=6, 2 females) were students who considered themselves to have sedentary lifestyles. Questions addressed their current lifestyle and habits, opinions on activity monitoring, activity sharing within a social group, and about the possibility of sharing challenges.

Most interviewees understood the importance of a healthier lifestyle and were interested in making positive changes. They liked activity monitoring, and preferred to see progress through real data such as body weight and blood pressure. Most of them preferred an expert or a friend to motivate them, instead ofstrangers. They suggested a system that would be linked to their schedule, so it could remind them to do activities whenever there was an empty time slot. On the topic of sharing, they reported that they had no reservations about sharing information with close friends. On the topic of feedback, they indicated that they would prefer positive encouraging feedback rather than negative.

These results reflected an agreement towards our initial design concept, further specifying features like the presence of an expert and the preference of interacting with closer friends rather than strangers.

In: Wouters, I.H.C.; Tieben, R; Kimman, F.P.F.; Offermans, S.A.M. and Nagtzaam, H.A.H. (Eds.)
'Flirting with the Future', Proceedings of SIDeR '09, April 15-17 2009, Eindhoven University of Technology, the Netherlands.

Concept Test

After the interviews, we designed a web application that implemented the main features of our concept. This prototype was used in order to further specify requirements, and to see how users would respond to our concept of social goal setting. We invited participants (n=8, 2 female) to work with the application for one week. We targeted sedentary people that worked in the same office; however, they were not all sedentary, as we observed later.

The features implemented in this application were: activity logging, setting and accepting challenges, sending and receiving comments, and the presence of an expert. This expert, which was actually controlled by one of our group members, was seen as a virtual coach by the users. He proposed some challenges, reminded users of their goals and gave feedback on their actions. We tested the challenge setting in two ways. Initially, by proposing all kinds of different challenges through the virtual coach, and then, by observing what kind of challenges the users themselves came up with. The challenges set by the coach ranged from individual to group challenges, and from very easy opportunistic activities (taking the stairs), to real sports (going for a run). At this stage, we did not use the mentioned activity monitors. We relied on users' input in the web application as to what challenges they managed to complete.

After one week of testing, we interviewed each of the users to gather feedback on the application. In addition, we analyzed the data recorded in the system's database. We found that most users asked for more feedback and information about the other participating users, such as: who is doing what, who completed the most challenges, which ones did they accept, total calories burned, total kilometers walked, etc. Users pointed out that they preferred to accept challenges that were easy to accomplish. As for the rejected challenges, most users said that those challenges were unrealistic, boring, or too difficult. The real sedentary users reported that they preferred opportunistic activities.

Most users liked the system and thought it would work well. Most appreciated characteristics were the social aspect that allowed interacting with friends, and the coach, who was perceived to be a real expert. Most importantly, they reported that it really stimulated them and made them think more about their activities. In addition, all users reported difficulties with checking the system during weekends, because they were almost never at a computer. Therefore, most users suggested a mobile implementation.

Video Prototype and Focus Group

Next, we designed a 4-minute video prototype to illustrate all functionalities of our concept [7]. A focus group was carried out to get feedback on this prototype. This was done to assess people's attitudes towards the concept of activity sharing and monitoring with a challenge setting approach. All invited participants (n=6, 2 females) were office workers. As a start, questions were asked regarding healthy lifestyles and how they defined their own lifestyles. Then, the video prototype was shown, followed by an extensive discussion.

Contrary to the previous concept test, users showed resistance towards the challenge setting approach, fearing peer pressure. They suggested that for the system to be more fun and fair, the person who sends a challenge should also have to complete it. In accordance with the other interviews, challenges should preferably be sent by friends or an expert. Participants appreciated most the idea of inviting friends to perform group activities with them. Participants disliked the alerts and reminders because they could turn out to be annoying. They also suggested integration with their daily schedule.

Most participants agreed that the most important thing on the system would be selfawareness, and that they would like to see their improvement over time. Participants wanted the activity recognition to be reliable and aware of possible cheating. Participants were open to sharing activity information with each other. Regarding the technology, the group thought that the use of a cell phone based system would make the application more accessible during weekends.

Final Concept

We thoroughly analyzed the results from all user-centered design iterations, and extracted a long list of requirements for the concept. Most requirements were already met by the concept, but several requirements demanded some changes. We list the most important changes here.

Overall:

• Users can only be in the same group if they have the same level of physical activity.
• Users in the same group are preferably friends or close colleagues.
• The system provides easy access on a PC (i.e. tray icon, or popup reminder, not only a website).

Challenges

• Challenges will be more structured (what, how long, when, where).
• Accepted challenges will be displayed as such.
• Users will be able to mark a challenge if they do not want to do it, and it will appear as such.
• The system will focus on group challenges and on opportunistic activities.
• The system will launch challenges that fit into users' current activities (level, time, location, required equipment).
• The user who sets a challenge automatically accepts it as well.
• There will be a limited number of challenges per day.

Displayed Information

• The system will provide self-awareness through overviews of user's achievements, like burned calories, etc.
• The system will provide self-awareness through predictions of future status when current activities are continued.
• The system will show group information about how many people did a challenge, how many did not, etc.

Feedback

• The virtual coach will send immediate real time feedback to the user, after fulfilling a challenge.
• Feedback will be grouped per challenge.

Reminders

• The system will persuade users more to send/accept challenges.
• The system will send as few reminders as possible (only when the user is inactive for too long).
• The system will have the capability to be

turned on silent mode, so it will not send reminders.

Using all these insights, we created a highly detailed description plus a UML use case diagram of our final concept. A small version of this UML model is displayed in Figure 1. To do a solid evaluation, we are planning to build a fully functional prototype of our design concept. This will include user access through a PC and through a mobile device, fully automatic measurement of physical activities, and all other aspects of the final concept.

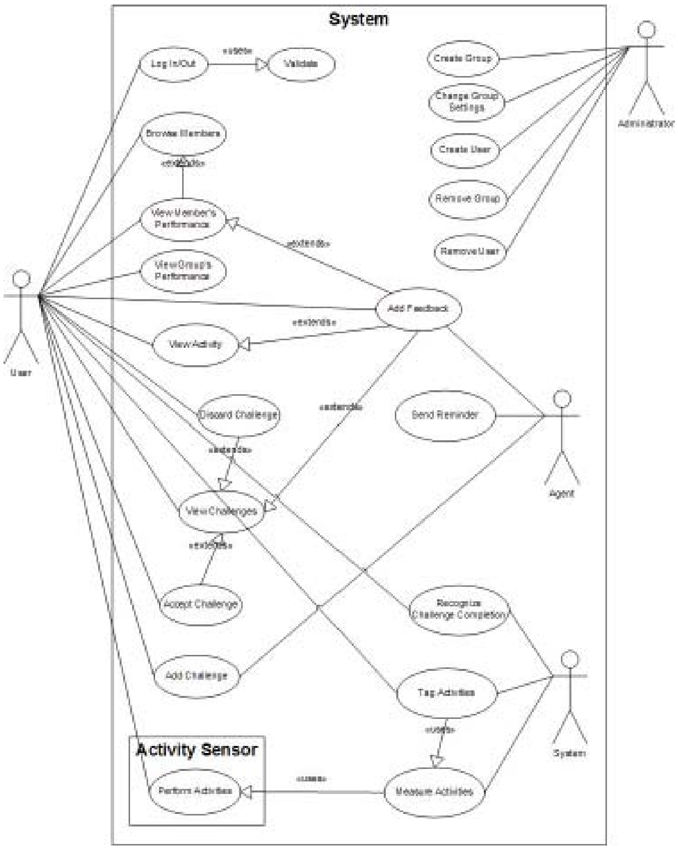

Figure 1

Evaluation

For the evaluation of our final concept, we are planning to invite two groups of sedentary users, where each group consists of at least five close colleagues. Before participating, they will be requested to fill out a short questionnaire (International Physical Activity Questionnaires, IPAQ) [8] to obtain comparable estimates of their physical activity. The results will make sure that the groups will be composed of people with low levels of physical activity. The concept will be tested in a six-week trial, using fully functional prototypes. The first two weeks, we will measure the physical activity of all users, to get a baseline of their activity. The next two weeks, one group will use our final concept, whereas the second group will use a stripped version, with self-monitoring and without social challenge setting. After these two weeks, the groups will switch concepts, so group one will use the stripped version, and group two will use the full final concept. The scheme of our evaluation tests is shown in figure 2.

The stripped version will only have the following three features:

• Overview: The possibility to see the total amount of physical activity done by the user.
• Self-monitoring: A graph displaying the activity done in terms of calorie expenditure in distinct zoom levels (week, day, hour).
• Shared activity: The possibility to see the total amount of activity performed by the other users of the system.

To assess the physical activity increase, we will compare the activity results of the interventions with the baseline measurements. In particular, we will compare the activity increase (with respect to baseline activity) separately for the weeks in which they used the full version and the weeks in which they used the stripped version, to see whether our concept motivates people more than only selfmonitoring.

References

1. Orzano, AJ, Scott, JG. “Diagnosis and Treatment of Obesity in Adults: An Applied Evidence-Based Review”, J Am Board Fam Med 17, 2004

2. Mattila E, Pärkkä J, et al. “Mobile Diary for Wellness Management—Results on Usage and Usability in Two User Studies”, in IEEE Trans Inf Technol Biomed, 2008

3. Lin, JJ, Mamykina, L, et al. “Fish’n’Steps: Encouraging Physical Activity with an Interactive Computer Game”, UbiComp 2006, Springer-Verlag Berlin Heidelberg, 2006

4. Consolvo, S, McDonald, DW, et al. “Activity sensing in the wild: a field trial of ubifit garden”, CHI ‘08, ACM, New York, 2008

5. Weldon, E, Weingart, LR. “A theory of group goals and group performance’, The meeting of the Academy for Management, Anaheim, 1998

6. B.J. Fogg, “Persuasive Technology – Using computers to change what we think and do”, Morgan Kaufmann Publishers, 2003

7. “Design Case Concept - Persuasive Technology”, www.vimeo.com/2170744

8. “International Physical Activity Questionnaire”, www.ipaq.ki.se

This paper is the design argument of a submission to the SIDeR ‘09 Conference. The full submission, including an elaborate explanation can be found on www.sider09.com

A Scrum tool for improving Project Management

Louise Smed Møller, Freja Bange Nyboe, Tobias Bornakke Jørgensen, Jens Jarl Broe

Roskilde University – HumTek, Universitetsvej 1, 4000 Roskilde, Denmark
Phone: +4546743702, E-mail: nielsj@ruc.dk

Abstract
Scrum is a new approach to project management. Instead of having a lengthy plan-driven project you work in small 15-30 day iterations with daily stand-up Scrum meetings where you use some simple visual tools to create a team feeling of progress. We have developed a specially designed Scrum tool. In this paper we show that this tool improves the way an architectural firm, Arkitema, uses Scrum.

First we observed Scrum in daily practice and interviewed the users at Arkitema and later on in other companies as well. As a result we identified a need for a better tool to visualise the different user stories, with high accessibility and where project history and overview are the main elements. To address that need we undertook an iterative and participatory design process including a number of usability tests.

Our conclusion from the tests is that Arkitema's use of Scrum improved with the help of the Scrum tool that we designed. In this paper we present our development process and describe the design of our tool. Finally, we discuss whether the Scrum tool we developed will be useful outside the context of Arkitema and reach the conclusion that the tool can be used for other companies as well

Introduction
Two main positions exist in project management: Classic plan-driven management and more contemporary agile project management [1]. One of the most well known methods in plan-driven project management is the waterfall model, where each phase of the project is planned in advance and there are clearly delineated interfaces between phases often called "gates". Recently project management methods have gone through a development resulting in alternative methods: The agile project management methods, to which Scrum belongs. As the word "agile" indicates, this method is able to respond to frequent and unforeseen changes in the project.

Scrum is an iterative design method. The word Scrum originates from rugby, and refers to the situation where the team is gathered to plan the following part of the game[9]. This also describes the essence of Scrum where the team gathers each day and informs the others of their current work situation (the daily Scrum). This meeting should last no more than 15 minutes and be conducted with all team members standing up.

Scrum runs in short sprints varying from two to four weeks. Before each sprint, a sprint-planning meeting is conducted, where the work for the upcoming sprint is determined and converted into user stories. After each sprint all product related work should be in a state ready for release. This distinguishes Scrum from plan-driven project management, in that you get visible and tangible results that the customer can relate to[8].

Besides the Scrum team there are two important roles: Scrum Master and Product Owner. The Scrum Master facilitates the project and works to protect the team from external interruptions. He or she also runs the daily Scrum meeting. The Product Owner represents the customer's needs and commands and is also the person who writes and prioritises the user stories. Finally you have the team, which is the working force responsible for the delivery of the product under the facilitation of the Scrum Master.

Delimitation
The main purpose of the project was to design a tool to visualize and assist project management with Scrum. In this study we have focused on the interest of the Scrum team as a group and on the individual's interests, and not on the interests of the organisation, whose interests are not necessarily equivalent to the interests of the team. We do however believe that the main interest of the organisation should in most cases be the same as that of the team.

This study has been conducted based on the acknowledgement that Scrum, for most users, is a theoretical underlying base from where their own processes are devised [4]. Also we support a constructivist paradigm, not believing in eternal requirements and theories outside a current time and space [1]. In light of this, we have overall chosen an inductive method rejecting the design goal of developing a universal tool for all Scrum managed projects.

Gathering of empirical data
Following a literature study of the 'theoretical' usage of Scrum, the design phase was based on two qualitative interviews with two Scrum masters: Joos Jerne and Morten Stahlsmidth both from the company Arkitema, not working on the same project. Subsequently an observation of a daily Scrum meeting at Arkitema was conducted. We experienced a problematic usage of Scrum, one of the main deviations being a lack of efficiency, which resulted in the Scrum meeting lasting 32 minutes instead of the 15 minutes that Scrum prescribes. This was mainly due to the 11 team members not following the Scrum guidelines, as they went into discussions about details. We then decided to undertake an extra interview and observation with another project leader Karin Hansen and her Scrum team at the company Danske Spil. This was mainly done to create a better understanding

In: Wouters, I.H.C.; Tieben, R; Kimman, F.P.F.; Offermans, S.A.M. and Nagtzaam, H.A.H. (Eds.)
'Flirting with the Future', Proceedings of SIDeR '09, April 15-17 2009, Eindhoven University of Technology, the Netherlands.

of how Scrum is used in different companies.
With the knowledge that Scrum is rarely being utilised as the theory prescribes, we chose to uncover the "real" users of Scrum. We further participated in a one day conference for organisations and companies, where they shared their experiences using the agile methods. We found that many companies' usage of Scrum was working far better than that of Arkitema, this knowledge was highly applicable for optimising Arkitema's Scrum usage. It was also our experience that Arkitema was not the only company lacking rigor in their usage of Scrum, which was confirmed by adviser Kristian Haugård from goAgile who works with helping organisations to use Scrum better.

Specification requirement

The design focused on assisting the daily Scrum meeting. Based on the gathered data mentioned above we constructed a list of design requirement based on the needs described by the future users and experiences gathered from further Scrum users and experts. Four overall requirements were established:

1. Intuitive user interface: The major strength of Arkitema's current solution is its simplicity and intuitive nature. No major introduction to the system was needed. This requirement seemed particularly important in an agile perspective with a goal of "Individuals and interactions over processes and tools" [10].

2. High accessibility: In the often very busy days, the company did not possess time for technical breakdowns or long boot times. At the same time the result of such problems would be a change of focus from the meeting to the tools, conflicting with the agile idea.

3. Commitment to Scrum: Poor physical surroundings, lack of Scrum literacy and less interest in the overall common project goals all resulted in a lack of commitment to the Scrum process and Scrum meetings.

4. Project history: The current tools used at Arkitema lack the possibility of looking further back into history than the current week. This resulted in time wasted on discussing previously performed (or not performed) tasks.

Design description

The result of this study is the application that we have called Scrummer. Based on the idea of a normal bulletin board, Scrummer allows the user to move 'post it' notes freely within the interface[6]. Each 'post it' represents a user story, making it possible to switch a user story's status, and change the person accountable. When double "clicking" a 'post it', a pop up window comes up with information about the user story, which can be modified. To create a new user story, the user simply drags their finger downwards.

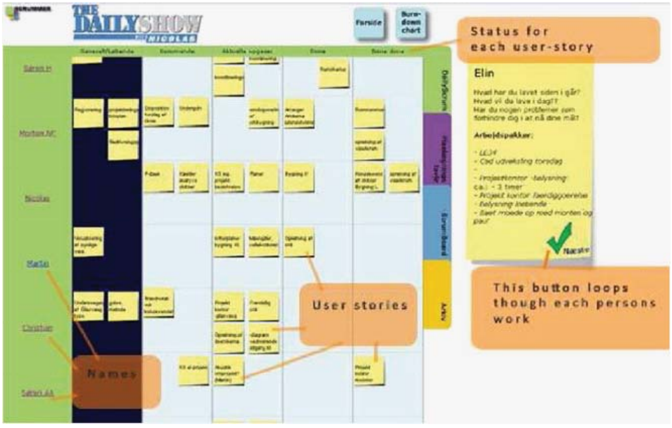

Figure 1. Screen dump of Scrummer during a test

When the daily Scrum is held, Scrummer runs a 'wizard' hereby guiding and supporting the process .

Design methods

The final design was reached through three iterations: The mental design iteration establishing the concept and overall design, the physical implementation iteration where ideas were turned into code, and the adaptation iteration where the design was modified according to user needs. The three iterations were then each separated into a design phase, a test phase and an evaluation phase. The type, goal and time for the tests were specified by normatively using the Pries-Heje et al. strategic framework [7]. All design phases made use of several different methods and combinations of these. At the mental design iteration De Bonos 'Six Thinking Hats' [2] were combined with a brainstorm method inspired by the American company IDEO [3]. Also a preliminary analysis of technical possibilities and problems were conducted to help in determining the further approach. The ideas produced using these methods were afterwards communicated and tested by use of paper prototypes and storyboards.

The physical implementation made use of a lot of open source code found of the Internet. The adaptation of this code did consume some time but the overall time saved using pre existing code was still significant. The design was in the end reviewed through a think-aloud technique assisted by a project leader from Arkitema. At the adaptation stage two major naturalistic tests were conducted during two daily Scrum meetings at Arkitema. The fact that we had two naturalistic tests gave us the opportunity to solve some of the problems found at the first test, so the application worked even better in the second test.

Flirting with the future

Scrummer is our response to what the future might bring within the field of project management. The final product is a direct result of the requirements found through our research, described earlier in this paper. To meet these requirements, the solution has been to take on the technology of tangible interaction effectuated by use of a smart board as the main user interface. The smart board gives the user the ability to interact with a large scale board, similar to a traditional bulletin board, by use of their fingers.

Making the application tangible brings a new dimension to the design, making it possible to break down the barriers between the computer interface and real life. In our context this is done by working the metaphor [5]. An example could be the use of the 'post it' note as a metaphor throughout the design hereby increasing the accessibility of the design and enhancing the general interaction. In this way Scrummer stays highly accessible by using the metaphors of the old and low tech project management tool used by Arkitema and yet brings a new dimension, such as history, commitment et cetera, by making it tangible.

Conclusion

We have designed an application that is compatible with and supports Scrum as a project management method. Instead of making a very advanced and highly complicated design, we have focused on developing an intuitive user interface and an application that is easy to handle.

Furthermore we have with our application seen how Scrummer can help Arkitema to be more true to the Scrum theory and thus optimise their usage of Scrum. Our ex post tests show that the Scrum team at Arkitema was more active and committed and they showed a greater respect for the Scrum master, the Scrum board and hereby also the Scrum rules. With Scrummer we also added a (to Arkitema) completely new function: The ability to see earlier user stories and thereby add history to their project. This function now saves unnecessary discussion since they just have to check the archive.

The future for this application seems bright. In only three weeks Scrummer was designed and the application did contribute to a better Scrum process at Arkitema's. The tangible interface has helped the application to obtain both intuition and high accessibility. The archive function adds the history to the project without having to do a time consuming documentation of each user story, and thereby still respect the agile manifest which states: "working software over comprehensive documentation" [10].

We believe that this application, in spite of its simplicity, or maybe because of it, can be very useful for many organisations like Arkitema, who seek a tool that provides the necessary options and yet retains the intuitive user interface and high accessibility. Based on the enthusiasm of the team, we also conclude that using Scrummer in similar organisations could be an exciting alternative to more simplistic traditional tools.

Bibliography

1. Biering-Sørensen, (2004). Praktisk It-Projektledelse. Forlaget Samfundslitteratur, 1. Udgave.

2. Bono, E. d. (1985). Six Thinking Hats. Penguin Books.

3. IDEO (u.d.). Ideo.com. obtained December 6, 2008 from http://www.ideo.com/

4. Kasse, T. (29. November 2008). Presentation - Professional agile development includes maturity.

5. Mau, Bruce (u.d.). Brucemaudesign.com. obtained December 6. 2008 from http://www.brucemaudesign.com/

6. Norman, D. (2008B). The Design of Everyday Things. in J. Pries-Heje (red), Kompendium i faget Design og Metode (s. 190-207). Roskilde university center.

7. Pries-Heje et al. (2008B). Strategies for design science research evaluation (SDSRE). I P.-H. e. (Red.),

8. Schwaber, K. (2004). Agile Project Management with Scrum. Microsoft Press.

9. Takeuchi, H., & Nonaka, I. (January-February 1986). New New Product Development Game. Harvard Business Review

10. Beck et al. (2001). Manifesto for Agile Software Development. Obtained September 23. 2008 from http://agilemanifesto.org/

This paper is the design argument of a submission to the SIDeR '09 Conference. The full submission, including an elaborate explanation can be found on www.sider09.com

Visualization of the information for reducing the cognitive work load for Harvester Machine Operators. Complex Interaction in Specialized Vehicles.

Benjamín López, Umeå Institute of Design, Umeå University
SE-901 87 Umeå, Sweden
Phone: +46 (0) 73 827 0981, Fax: +46 (0) 90 786 66
lopez.benjamin@gmail.com

Abstract
This project proposes a new way of visualizing the necessary information for operating a Harvester Machine. The final aim is to demonstrate how the arrangement of the information to be handled while operating the machine and the way this is visualized, make easier the control of the machine and reduce the stress loads for the operator. The Harvester machines are used for felling, delimbing and cutting trees into predetermined lengths. The control layout in the cabin comprises computer displays, traditional control panels and two joysticks for controlling the crane arm and the cutting head. Contextual inquiry and interviews were done during the research stage of the project in order to find the main causing factors of the stress situation while making decisions as a harvester machine operator. The operator needs to compare numerical values on the screen and check information on the forest at the same time before making a decision. Technologies such as head-up display [10] and eyes tracking system [11] take part in the final solution, for supporting the final concept and make the new way of human-computer interaction possible and effective. All the content and the information is divided and prioritized in levels according to the importance and frequency of use.

Keywords
Harvester Machine, visualization of the information, head-up displays, human machine interaction, eyes tracking system.

Introduction
The Komatsu project has been done by the first year's students of the Master Program in Interaction Design at the Umeå Institute of Design as part of the work requested during the first semester of this programme, fall 2008. The time available for carrying out the project was 10 weeks.

Figure 1. Harvester Machine Valmet 941.1 Komatsu Forest.

The harvester machine on matter is the Valmet 941.1 (figure 1), which utilizes the MaxiXplorer software as an interface between the operator and the system. For operating specialized commercial vehicles it is necessary to combine driving and maneuvering with other tasks such as excavating, moving logs or forestry work [1]. Today, the operator is also responsible for handling and increasing the amount of information while driving and maneuvering the machine. These additional tasks demand a high cognitive work load and extensive training is often required to master the complex modes of interaction.

This project focuses on the study of man-machine interaction in forestry logging harvesters and the approach of the research work on this project is user centered. By means of this specific type of research, the aim is to prove that the way of visualizing the information necessary while working it is really important and it is directly proportional to the time the operator spends in making a decision. Since the operator has to make several decisions in the process of logging a tree, if the final proposal make this process easier can reduce considerably the time for performing the mentioned task.

Several design research methods were used in order to find and identify the design opportunity to work on. Relevant aspects were considered for being included in the research stage in order to cover the majority of the necessary information for the development of the project. Information about different topics such as cognitive ergonomics, learning process, perception, task analysis and anthropometrics resulted very valuable for the project.

Research Methods
According to Dan Saffer, design research has many methods, drawn from other disciplines or created by designers over the years. These methods can be roughly divided into three categories: observations, interviews, and activities [2]. The kind of observation method that was used in this project was the one known as "Contextual Inquiry", which involves going to the subject's location and asking questions about their behaviors, asking opinions about the machine functionality and previous experiences with it. Afterwards, I was able to make interviews to some of the operators I visited in a different place outside the machine (figure 2).

In: Wouters, I.H.C.; Tieben, R; Kimman, F.P.F.; Offermans, S.A.M. and Nagtzaam, H.A.H. (Eds.)
'Flirting with the Future', Proceedings of SIDeR '09, April 15-17 2009, Eindhoven University of Technology, the Netherlands.

Figure 2.Contextual Inquiry with Dennis the operator.

These research activities represented the most valuable stage in the research phase, since the approach of the project is to apply the concepts of User Centered Design and Participatory design based on the work carried out by Buur & Bødker [3]. Different techniques were used for collecting the information of these visits. The observations and interviews were recorded in order to have all the possible details [4,5,6]. Later on the ideation stage, all the data collected in videos was reviewed and analyzed again to find the design opportunities.

Other complementary techniques were carried out during the observations such as taking still pictures, observing context issues that cannot be recorded on the video (vibrations, odors, weather) and taking field notes [2].

Conceptualization

Since the aim of the objective is to bring a benefit for the operator and improve the interaction with the machine he operates, a very important part of the project was the analysis of the observations and interviews to better understand how the user behaves while working with the machine and how the user manage and process the content. These results led us to define the areas to work on.

1. Arrangement of the information
The sources of visual input are too far from each other, this represents that the operator have to look at different points while performing a task (e.g. looking at the forest and screen at the same time).

These changes of focusing provoke problems in concentration and a delay in making decisions. The operator has to check the assortment on the screen almost at the same time he is looking for damages on the tree. It is difficult for the operator to check the quality of the tree in a normal situation because of the tree's shape, but it is even more difficult if they have to check data on the screen simultaneously. If the operator finds damages on the tree, he has to change the quality immediately; otherwise the log to cut is going to be useless because it doesn't correspond to the quality set it in the price list. The toughest part is that he has to check again the tree and the screen just to be sure that the length and the assortment suggested by the system, are going to fit in the quality area on the tree.

2. Prioritizing the information
Prioritize the information displayed on the screen is definitely important to propose the new arrangement of the information. This arrangement must be based in the frequency of use as well as the level of importance of each data displayed on the screen.

3. Overload of information on the screen
It is not necessary to have a lot of information always visible, it is better just have the information when it is need it.
Avoiding extra information on the screen represents less distractions for the operator and produces a high level of concentration while performing a task.

4. Difficulty to read numbers and process them
The fact that all the data displayed on the screen is showed in numbers represents more difficulty for the operator to understand it and it takes more time to read in comparison with more graphic visualization [9].

5. Lack of differentiation of elements in the graphic user interface
The elements on the graphic interface look like the same. They all are based in the same box outline and they all use numerical values [7]. The only data is presented graphically is the length of the log and the tree species (different colors according to the specie).

Analysis of the content

A more detailed analysis was done to break down all the information displayed on the screen and define exactly, what are the elements that should be available for the operator and in what situations.

The information was classified by dividing it in four main groups, according to the frequency of use and the level of importance for the working process:

1. High frequency of use and high level of importance. Main information.
2. Few times used and high level of importance. Information about the status of the machine
3. Frequently used and low level of importance. GPS, communication devices, etc.
4. Seldom used and low level of importance. Settings menu

Final result

On the final proposal, the interface of the machine is completely changed. The previous screen for displaying the information was replaced for a Head-Up display for presenting the data without requiring the user to look away from his or her usual viewpoint [10]. A new dashboard for showing the content in different levels to the operator was designed (figure 4).

Since the information is now split up in different areas, the final result proposes the use of an eyes tracking system for controlling the moment when the information needs to be displayed. If the system knows where the operator is looking at, the information only will be showed when the operator needs it.

According to the analysis of the content done previously, the information was divided in four groups. Each group of information has different designed areas either on the HDU or on the dashboard, as well different behaviors and features.

Main information / Level one of information
The group number one, which contains all the main information necessary for executing the tasks of logging the trees, is the only one that is visible all the time while doing this task. The information is showed in the same visual field of the operator (HDU). This means that he does not to look in two different places. On the other hand all the information showed in the interface is displayed in a graphic way instead of numerical values. This fact makes the operator executes the comparisons of the values in a faster way and requiring less mental effort (fig. 3).

Figure 3. Visualization of the main information on the head-up display.

According to the research the previous values were showed in numbers on the previous interface. In this proposal, instead of comparing numbers the operator just compare graphics placed on his main visual work area.

As we can see in the figure 3, the operator just see the information he needs at the moment. All the information that belongs to another group of information is hidden to avoid distracting visual noise.

For visualizing the information in the groups number two, three and four; the operator has to press the assigned button for activating the menus on the joysticks and then look at the area where the specific group of information is placed. It is important to mention that, if the operator does not press the button for visualize the hidden information, it does not matter if he looks at this area in the windshield, the menu will not show up. This information is not visible unless the operator wants to see it.

Status of the machine information / Level two of information
Since the previous screen is no longer in the cabin, there is an available space on the same place for situating the information belonging to level two and an eyes reader, an important element of the eyes tracking system [11] .

The proposed dashboard (figure 4) apart of containing the eyes reader, it contains the indicators of the status of the machine. Such indicators as fuel engage, temperature engage, oil engage, engine temperature engage are located here. The indicators about the driving direction, speed, door open, leveling system, ladder out, parking brake, etc., are also located on the dashboard.

Figure 4. Final proposal of the dashboard. It integrates several elements such as on-off button, contrast controls of the head-up display and indicators of the status of the machine.

All the information on the dashboard is situated a little closer than the information in group three and four. If an alert occurs the operator's eyes will perceive it faster because is situated in the middle vision field of the operator glance when he is looking at the front while working [8].

Frequent functions / Level three of information
This menu contains the functions the user needs to check frequently while he is not cutting the logs. These menus include shift timer, level of productivity of the day, matrix, cellphone, e-mail and gps function.

This menu is located in the top part of the windshield, what means that if the operator is cutting logs, he is receiving information in the central part of the windshield (central vision of the operator) and the hidden menu remains hidden (figure 5).

In case there is a notification about a special event in one of these functions, a visual and auditory alarm will occur on the peripheral vision.

Depending on the level of importance of each alarm such aspects as the time, sound, level of movement and intensity will change.For example, an alarm about the gps map will be more intense than a notification of receiving an e-mail.

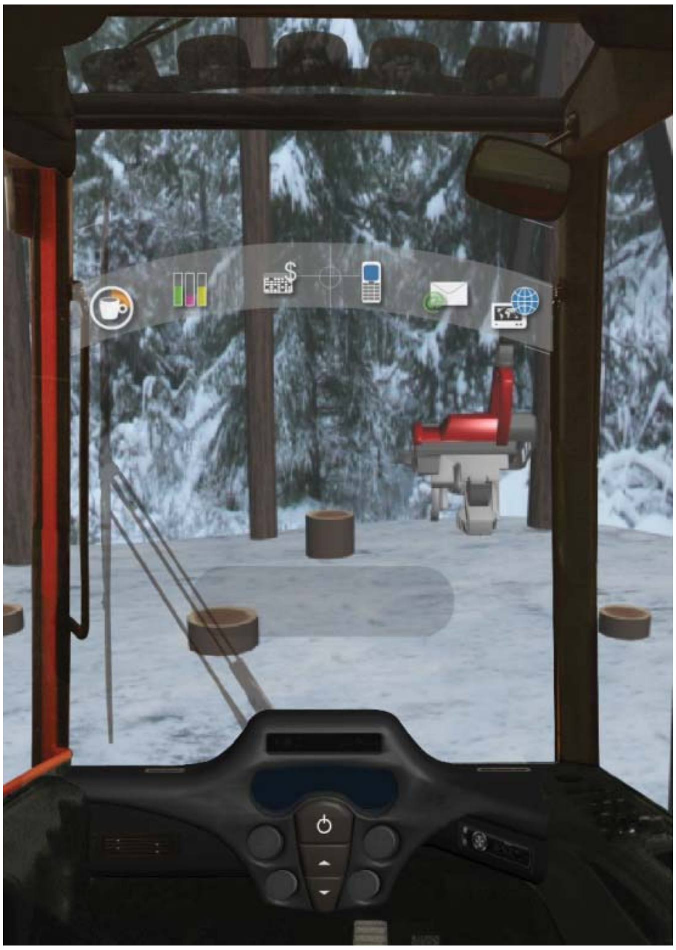

Figure 5. Visualization of the machine information (group 3) on the head-up display.

Settings menu / Level four of information
Information about the settings menu such as machine settings, head settings, report, portal, tools, detailed status of the levels, calibration and administration belong to this category (figure 6).

The frequency of use of these elements is much less than the information in the previous groups. Because of this, the location where this information was placed is further from the central vision than the others.

Even though the previous group and the settings menu are in the same visual area, the treatment of each icons is very different. The icons on the setting menu are monocromatic and drawed with outlines. The ones in the level three are colorful and dynamics.

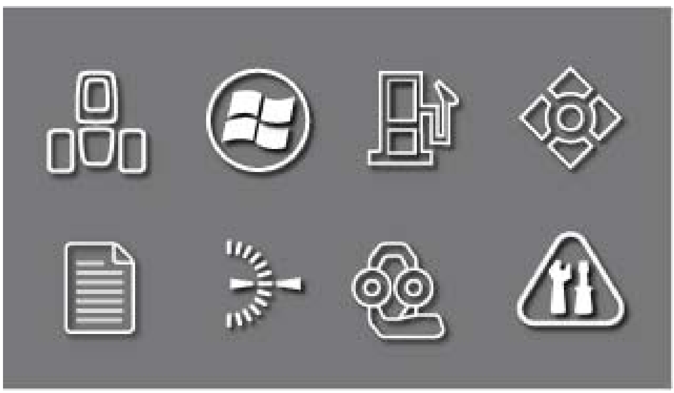

Fig. 6. Monocromatic icons for the settings menu.

References

[1] Wästerlund, Iwan (2008). Lecture at SLU: Swedish University of Agricultural Sciences. Umeå University. Umeå, Sweden.

[2] Saffer, Dan (2007). Designing for Interactions: Creating Smart Applications and Clever Devices. USA. pp 69-119.

[3] Buur, J. and Bødker (2000). From usability lab to "design collaboratorium": reframing usability practice. In Proceedings of the 3rd Conference on Designing interactive Systems: Processes, Practices, Methods, and Techniques New York City, New York, United States. pp 297-307.

[4] Interview made by the Students, Interaction Design programme. (2008) Contextual inquiry and interview work. Interview to Leif the operator (2008) Sweden. Umeå University. Umeå, Sweden.

[5] Interview made by the students, Interaction Design programme. (2008) Contextual inquiry and interview work. Interview to Richard the operator (2008) Sweden. Umeå University. Umeå, Sweden.

[6] Interview made by students, Interaction Design programme. (2008) Contextual inquiry and interview work. Interview to Dennis Holmgren the operator (2008) Sweden. Umeå University. Umeå, Sweden.

[7] Salvendy, Gavriel (1994). Handbook of Human Factors and Ergonomics. New Jersey, USA. John Wiley & Sons, Inc., Hoboken. Third edition. Purdue University, West Lafayette, Indiana and Tsinghua university Beijing, People Republic of China, pp 191-242, 1189-1245.

[8] Palmer SM, Rosa MG (2006). A distinct anatomical network of cortical areas for analysis of motion in far peripheral vision. Eur J Neurosci 24(8): 2389–405. doi:10.1111/j.1460-9568.2006.05113.

[9] Scholl, B. J. (2001). Objects and attention: The state of the art. Cognition, 80(1-2), 1-46.

[10] Pope, Stephen (2006). USA. The Future of Head-Up Display Technology. Aviation International News. Jan. 2006. 12 February 2007.

[11] Rayner, K. (1978). Eye movements in reading and information processing. Psychological Bulletin, 85, 618-66.

This paper is the design argument of a submission to the SIDeR '09 Conference. The full submission, including an elaborate explanation can be found on www.sider09.com

TacTower: Designing Physical Co-Located Multiplayer Interaction

Christine Jürgensen
lachris@cs.au.dk
Center for Interactive Spaces, Aarhus University
Åbogade 348210
Århus N

Majken Kirkegård Rasmussen
denmike@cs.au.dk
Center for Interactive Spaces, Aarhus School of Architecture
Nørreport 20, 8000 Århus C

Abstract

Learning from the multiplayer interaction in sports, we describe our project TacTower; a flexible system for professional elite handball players to train game perception and kinesthetic empathy. The design is founded in ideas of Collective Interaction and qualities that is inherent in sport and is based on considerations about paralanguage, kinesthetic emphatic interaction, physical positioning of players and collaborative interaction.

Keywords

Multiplayer interaction, kinesthetic empathetic interaction, co-located, face to face, sportyfied interaction, project work.

Introduction

By studying multiplayer interaction in a sports context we found a potential for improving multiplayer interaction, especially in an interactive sports appliance. Having the parameters that constitute interaction sport in mind: physical, social, visual, verbal, and mental contact, we examined some examples of existing interactive sports equipment. We found that they do not fully embrace the physicality and co-located collaboration that is so characteristic of sport interaction. In this paper we present a design solution TacTower, a new appliance for training kinesthetic empathic ability. The kinesthetic empathic ability is in short the ability to read body movement. This ability is founded in bodyawareness, empathy in interaction, freedom in movements, and micro-tactics [3]. In our design we seek to employ physical abilities by incorporating a tangible user interface [7].

Sports qualities gone missing in interactive sports equipment

What often distinguishes a good athlete from a great athlete in motoractive sports is the athlete's capability to accurately perceive and acting upon the constant supply of information from the environment while performing complex movements [11]. Perception and action can be trained by either focusing on the physiological dimension: psychomotor abilities and partly reflex actions, or focusing on the cognitive dimension: in-game decisions and kinesthetic empathy [3].

In the following section we take a look at two existing pieces of interactive training equipment that aims to train perception- and action ability; the Octopus trainer [9] which train the athlete's psychomotor abilities and IntelliGym [5] which train in-game decisions.

Octopus trainer consists of a computer and 8 light stations, which can either be mounted vertically on a rack or placed horizontally on the floor. Lights turn on and the player has to turn them off, by waving a hand or foot in front of the light at an approximate distance of 30 cm. Octopus trainer allows the athlete to train speed, strength, concentration and reaction in an isolated context removed from the interactivity of the game. Even though it utilises the sports inherent movement patterns the interaction is stripped of visual cues from other players. IntelliGym focuses on tactical aspects of basketball; the objective is to train the ingame skills of decoding other players' movements on the court, and determining the optimal action in a given situation. IntelliGym is a screenbased computer game, where a basketball court is viewed from above. Players and ball is shown as coloured circles on the screen. The circles move around the court in movement patterns similar to the sport, and from this the player has to choose a suitable strategy. IntelliGym allows the users to train game perception individually in an isolated context. As it is a PC game it is a passive raining, for improving court sense and enhancing concentration [5].

The training of the in-game decoding skills is removed from the physicality of the game, both in IntelliGym, as well as in Octopus trainer. Because the psychomotor abilities and the tactical in-game decision-making are closely linked, IntelliGym and Octopus trainer are not adequate. Therefore we aim with our project TacTower to combine in-game decoding skills with physicality.

Sport possesses qualities like physical, verbal and mental contact. What otherwise extinguishes sport is the importance of social collaboration between team mates. Collaboration is affected by many factors, both internal and external [4]. When designing interactive artefacts for sport it is therefore important to create a colocated interaction [8,10] which enables human-human interaction.

Paralanguage in human-human interaction

A pure human-human interaction can be describes as an ongoing negotiation between the people involved and their surroundings. The interaction does not only contain what is clearly stated in the actual conversation, but also the paralanguage[1] that the participants express consciously or unconsciously.

---

[1]*Paralanguage is identified as "features of written language which are used outside of formal grammar and syntax and other features, related to but not part of written language which through varieties of visual and interpretive contrast provide additional enhanced, redundant or new meanings to the message" (Asteroff, 1987).*

In: Wouters, I.H.C.; Tieben, R; Kimman, F.P.F.; Offermans, S.A.M. and Nagtzaam, H.A.H. (Eds.)
'Flirting with the Future', Proceedings of SIDeR '09, April 15-17 2009, Eindhoven University of Technology, the Netherlands.

Paralanguage greatly depends on visual contact, in order to convey the full extent of what is being stated in the negotiation [2]. In order to enable a human-human interaction that incorporates paralingual cues it is vital that the players are collocated and positioned in a way which allows them to see each other.
--Understanding paralanguage and visual cues is an essential element in sport on elite level. The object of our project, TacTower has been to incorporate paralingual cues into an interactive appliance for training handball. With the TacTower we aim to create an appliance that facilitates the handball player's training of kinesthetic emphatic interaction [3] in a sport context.

Learning from Collective Interaction

Sport possesses some of the same qualities as described in the Collective Interaction framework proposed by [8], from which the following is excerpt:

The interaction invites for human-human interaction beyond what is in the interface […] The spatial organization of people induces expectations of use. […] the interaction may be assymetrical, in the sense people take on different roles […]

In sport the ball is the "interface". In itself the ball is an inanimate object, but through imagination, play and collective interaction it invites to an interaction beyond it's physical interface. Sport allows for a collective interaction were the participants often have symmetric roles; the referee, goalkeeper, try line player etc. In sport as in collective work the proximity of the participants and interfaces plays an important role in the interaction [4].

Physical positioning of players in multiplayer games

Communication, proximity and spatial organisation plays an important role in collective interactions. In order to include all these aspects in a design we have to consider the physical positioning of the players.

Looking at some examples of how players are positioned in different types of multiplayer games with sport relations, we find some clear differences on how multiplayer interaction is played in the digital version compared to how it is played in the actual sport. The Nintendo Wii ™ can be defined as a Single Display Groupware (SDG) [10], that enables co-located players to play on a shared display and simultaneously use multiple input-devices . Players using a Nintendo Wii ™ are positioned side by side while playing a multiplayer sports game.

Figure 1

The illustration shows how the players' focus is projected onto the screen instead of on each other, thus loosing the possibility to perceive the paralanguage. However the game tries to convey the physical positioning of the actual sport by digitally positioning the players face to face. Most likely the players actually exhibit paralingual cues, but because of their physical positioning, they are not able to pick them up. Instead the players are limited to watching the digital representations, which is a poor substitute compared to actually seeing ones opponent.

If we compare the screenbased Nintendo Wii™ interaction e.g. with the kind of interaction that would take place during a real handball match, the positioning of the players and their visual focus is quite different. In a real handball match, visual contact, focus on opponents and teammates are vital. Face to face positioning enables the players to use their kinesthetic empathic ability to read their opponent's paralingual cues.

The drawing below shows a setup where players using Octopus trainer are positioned face to face. The positioning enables the players to have visual contact and to read the paralingual cues. But there is no direct interaction between them, as they only have to react on the basis of the system and not on the other player. In a real match the players are not acting upon random digital cues from a system, but instead acting on the paralingual bombardment of the match. So the ability to react on a systemic output is only valid as a way of training the reaction ability.

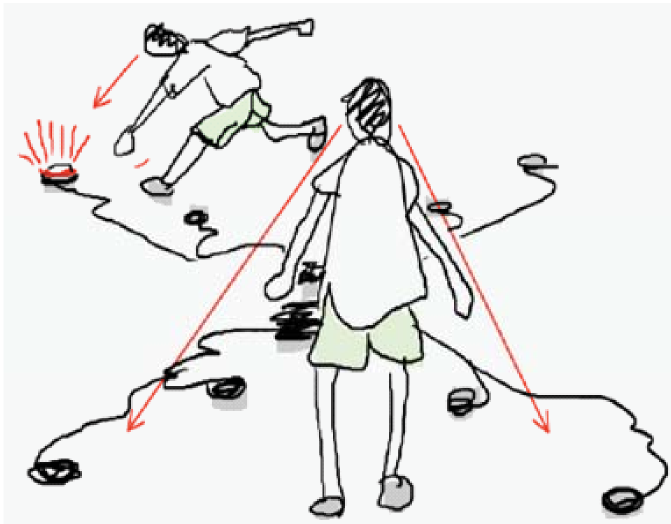

Figure 2

When designing for a sportyfied context, it is important both to have the players positioned opposite each other and to create a setting where it is possible and necessary for them to interact directly. But positioning the players opposite each other raises a problem: How to create an interactive interface that is positioned between two players and still allows them to see each other and physically interact with each other?

TacTower – training kinesthetic empathy

We answer the question above by designing a tangible interface distributed on four pillars, TacTower. The design allows for visual and physical contact between the players.

The TacTower is an interactive appliance for handball training which positions the players face to face and enables players to train their kinesthetic empathic ability and thereby developing the players' in-game micro-tactics. Micro-tactics in games like handball concentrate on decoding the opponent's actions and reacting upon them, e.g. by feinting or by preventing an attack. This particular ability is not only important in handball, but in many other branches of sport, where players are directly confronting their opponents.

TacTower is a modular system that consists of four TacTower which define the playing field. Each pillar consists of eight spherical units; each unit is illuminated from the inside by multicolored LEDs, and can be operated by striking or hitting the unit. Each unit can be affected from six directions; from four hitzones distributed at 90 degrees around the center and one from the top and one from the bottom. The user interacts with TacTower by hitting the hitzones, thus turning on the light in the unit or pushing the light signal in the direction of the hit. The direction of the hit is registered by an accelerometer placed inside each unit. By hitting the zones the player is able to shoot the light signals from one unit to another both horizontally and vertically. The TacTower can either be placed in a line or in a spatial grid, according to the gameplay.

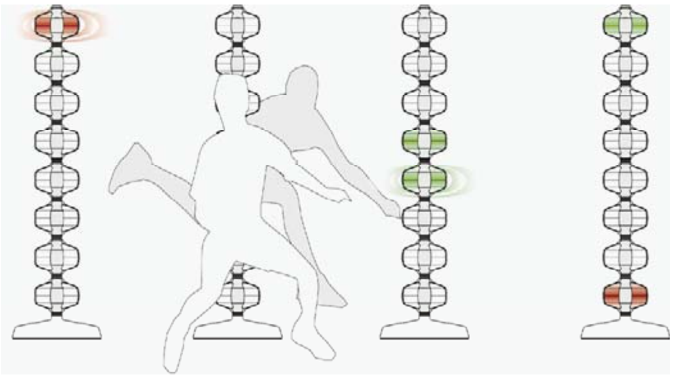

Figure 3

One person cannot play a game on TacTower alone, as it requires an opponent to play, because the game's main focus is the ability to create a powerful micro-tactic from reading the other person's movements.

Learning from sports - TacTower collaborative interaction

In sports there is a difference between acting and reacting, as the players have an opportunity to intercept and prevent an action by using their kinesthetic emphatic ability. But in a screen-based interaction the players are limited to reacting, as there are no hints of the next action, as the screenbased interaction is striped from paralingual cues.

A significant aspect of sport is the physical proximity of the players that creates a closeness which intensifies the interaction between them. We tried with TacTower to centre the interaction on the possibility to act on the opponents physical cues before the actual event occurs. This gives the player the opportunity to prevent an action as the visual cues are available. With TacTower we deliberately worked on increasing the players' proximity in order to maintain the sportslike qualities in the interaction. By positioning the player face to face we created a space to explore the potential of a physical paralingual interaction.

Future work

We are currently working on creating a working prototype, and setting up tests with handball players in order to see how effectively the TacTower train the empathic part of the bodily intelligence. We are aware of the difficulty in measuring the player's progression, as the game always depends on the opponent, which make it difficult to create a constant factor in order to compare each result. Instead we intend to collect data empirically through a prolonged test setup and evaluate by qualitative interviews from both players and trainers.

Acknowledgements

This project has been supported by the iSport design team at Center for Interactive Spaces, ISIS Katrinebjerg and the partners involved in the project.

References

1. Asteroff , J. (1987) Paralanguage in electronic mail: a Case Study. Unpublished doctoral dissertation, Columbia Unerversity.

2. Clubb, O. L., (2007) Human-to-Computer-to-Human Interactions (HCHI) of the communications revolution Interactions, Volume 14 , Issue 2, 25 years of CHI conferences: a photographic essay.

3. Fogtmann, M. H., (??)Kinesthetic Empathy Interaction - Applying psychomotor abilities to interaction design.

4. Hawkey, K., Kellar, M., Reilly, D., Whalen, T. and Inkpen, K. M. (2005) The Proximity Factor: Impact of Distance on Co-located Collaboration. Procedings of the 2005 International ACM SIGGROUP conference on Supporting Group Work.

5. IntelliGym, http://www.intelligym.com

6. Ishii H. and Ullmer B. (1997) Tangible Bits: Toward Seamless Interfaces between People, Bits and Atoms. In proceedings of CHI 97.

7. Ishii H. (2008) Tangible Bits: Beyond Pixels, In proceedings of the Second International Conference on Tangible and Embeded Interaction (TEI 08).

8. Krogh, P.G., Petersen, M.G. (2008) Collective Interaction - let's join forces. In proceedings of COOP'08.

9. Octopustrainer, http://www.octopustrainer.dk/sprog__da/

10. Stewart J., Bederson B. B. and Druin A. (1999) Single Display Groupware: A Model for Co-present Collaboration, In proceedings of CHI 99.

11. Williams M., (1999) Visual Perception and Action in Sport, chapter 4 Anticipation and decision-making in sport, pp. 96-143.

This paper is the design argument of a submission to the SIDeR '09 Conference. The full submission, including an elaborate explanation can be found on www.sider09.com

Search, Explore and Navigate – Designing a Next Generation Knowledge Media Workbench

Mathias Heilig[1], Mischa Demarmels[1], Sebastian Rexhausen[1], Stephan Huber[1] and Oliver Runge[1]
[1] University of Konstanz, HCI Group, Box D-73, 78457 Konstanz, Germany
+49 7531 88 3113
{Mathias.Heilig, Mischa.Demarmels, Sebastian.Rexhausen, Stephan.Huber, Oliver.Runge}@uni-konstanz.de

Abstract
Information work is a demanding activity caused by the increasing complexity of today's information spaces. Besides, information workers are acting correspondingly to their creative workflow, which involves multifaceted characteristics like diverse activities, locations and environments. Although it is important to find solutions to specific aspects of information work (information-seeking, information-management, media-warehousing, etc.) our design approach – MedioVis 2.0 – tries to support the entire workflow in one coalescing Knowledge Media Workbench, showcased in the context of digital libraries. To achieve this goal, we apply the concept of zoomable user interfaces, different visualization techniques and investigate additional considerations to provide a satisfying user experience.

Keywords
Zoomable User Interface, User Experience, Semantic Zooming, Information Landscape, Information Visualization.

Introduction
Nowadays, accessing digital information spaces such as personal data, online databases or the World Wide Web is a daily activity of nearly every individual. However, information work like "writing a scientific paper" or "investigating for a news article" is a very demanding task. One reason for this is the continuously growing complexity of information spaces, resulting from the increasing quantity and heterogenity of information objects and relations between them. Another cause is the difficulty in execution within a multifaceted individual creative workflow [1] [2] within today's digital information-systems. Such a workflow contains diverse activities like information-seeking, information-management or archiving of information objects. The majority of tools focus on assisting in single aspects of such a workflow like the very important task of information-seeking (e.g. MedioVis, *http://hci.uni-konstanz.de/research/projects/MedioVis*). Nevertheless, most of them are isolated applications that are hard to integrate into a creative workflow of a person. Content and functionalities are scattered over dozens of applications, websites, storage formats, interaction models and devices – challenging the user's cognitive skills respectively. This often leads to the necessity for workarounds, resulting in a destructive degree of complexity and "information fragmentation" [3].

Design Arguments
Based on these requirements for creative information work, we designed a "Knowledge Media Workbench" that supports the entire workflow in one unifying workspace [4]. Our approach, called MedioVis 2.0, tries to offer comprehensive visual support for all activities of creative work with digital libraries such as searching and browsing different information spaces (e.g. digital libraries, the web) or keeping and managing of information objects and knowledge artifacts for later use. As a data source we use the media specific part of the library of the University of Konstanz, consisting primarily of DVDs or VHS tapes. Additionally, we augmented this database with different online services like Google Maps *(http://maps.google.com/)* or the IMDb *(http://www.imdb.com/)*.

MedioVis 2.0 relies primarily on the paradigm of zoomable user interfaces and object-orientation. In consequence, no windows, icons, menus, files or dialogs are used. To accommodate the various activities of information workers, we integrated different techniques to search and explore the information space via different visualizations. To keep and manage information objects, MedioVis 2.0 offers personalization functionalities. Finally, the concept has been designed to work on various devices like PCs, mobile devices or multitouch tables, presented with one consistent user experience.

Zoomable Object-Oriented Information Landscape (ZOIL)
The fundamental visualization and interaction paradigm of MedioVis 2.0 is the idea of a Zoomable Object-Oriented Information Landscape (ZOIL) [5]. Within this paradigm, an information landscape of virtually infinite size serves as basic starting point for exploration of the information space (see fig. 1a). MedioVis 2.0 arranges each media object, corresponding to its primary genre on the landscape. Users are able to navigate in this landscape with zooming and panning operations [6]. This navigation technique takes advantage of the human abilities of visual-spatial orientation and remembering visual "landmarks" [7]. By employing this concept, users are able to utilize natural and intuitive operations as search strategy in media collections (see fig. 1a-c).

The more the user zooms into the content, the more details and functionalities are revealed by a "semantic zooming" approach (see fig. 1a-c), following the visual information-seeking mantra of Shneiderman [8]: "Overview first, zoom and filter, then details-on-demand". Thus, the available functionalities such as playing a video (see fig. 1c) or accessing a website (see fig. 2a) are always coupled with the information object itself, as it is proposed by object-oriented user interfaces [9].

In: Wouters, I.H.C.; Tieben, R; Kimman, F.P.F.; Offermans, S.A.M. and Nagtzaam, H.A.H. (Eds.)
'Flirting with the Future', Proceedings of SIDeR '09, April 15-17 2009, Eindhoven University of Technology, the Netherlands.

Figure 1. (a) Initial screen of MedioVis 2.0 (b) Zoomed into the action region (c) Most detailed semantic zoom level of a movie object (d) Query "batman begins" entered into the search field on the upper right.

Search, Filter and Explore
Analytical search methods are supported by MedioVis 2.0 as another way to formulate information needs. Users are able to enter text queries into a search field on the upper right corner of the screen (see fig. 1d). With each key press, the visual representation of matching objects expands. We applied the concept of Dynamic Queries and Sensitivity [10] for direct highlighting of objects, which still match the current query instead of removing all non matching objects. With this technique, the attention of the user is automatically directed towards media objects of current interest.

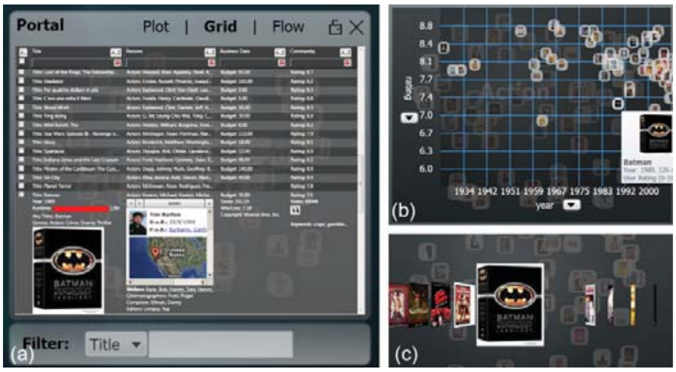

Figure 2. Portal containing all action movies. The user can choose between (a) the HyperGrid, (b) the HyperScatter and (c) a rapid serial visual presentation inspired by Apple's Cover Flow (http://www.apple.com/itunes/) .

Portals and Visualizations
Portals [7] provide a supplementary way of exploration. By selecting an arbitrary region of the information landscape via a bounding box, the user creates a portal, providing a special view on the underlying media objects. Within portals, MedioVis 2.0 offers multiple visualization techniques – for understanding, filtering and querying – ranging from a rapid serial visual presentation (see fig. 2c) [11] over a scatter plot visualization called HyperScatter (see fig. 2b) [12] to a table-based visualization called HyperGrid (see fig. 2a) [13].

The HyperGrid is a novel visualization integrating zooming concepts and an internet browser into the well-known spreadsheet visualization. Every row, representing one media object, can be zoomed to access further information. By integrating the hyperlink-concept and an embedded internet browser, users can immerge into the information space without losing their context.

Furthermore, portals provide visualization-independent filter mechanisms. These filters are preserved even if the user switches the visualization. By moving and scaling portals in the landscape, MedioVis 2.0 allows to visually formulate complex queries in a direct-manipulative manner [10] as proposes with the concept of magic lenses [14].

Personalization
To retain the state of a portal – with its filters and visualizations – for later use, MedioVis 2.0 provides the possibility to "lock" and assign a name to portals. Furthermore, users can reach their personal region of the information landscape (see fig. 3) by logging in via the circular region at the center of the landscape, revealing space to store and manage individual information artifacts. Drag & drop operations allow adding previously "locked" portals or copies of single media objects into this region. A search task is therefore no longer a transient action that is often difficult to repeat but rather a persistent object of a creative work process. Furthermore, the personal region can be organized individually by annotating, labeling and arranging artifacts the way that fits best to the user's needs.

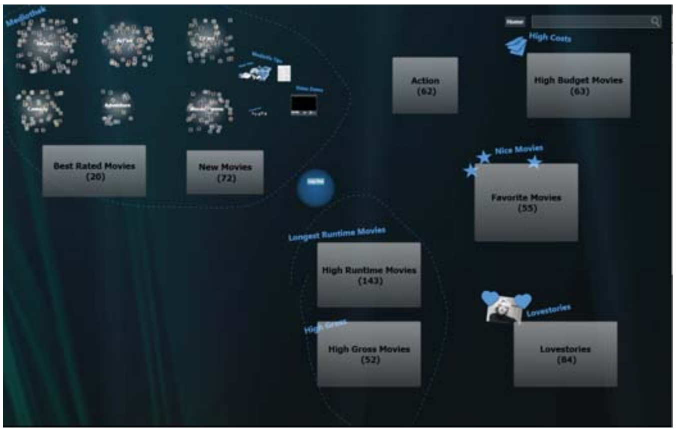

Figure 3. Users reach their personal region of the information landscape by loggin in via the circular region at the center of the landscape. The portals are represented in different semantic stages, depending on the zoom level of the landscape.

2.5 Multiple Environments and Devices
Creative information work is a complex activity, usually executed in varying physical and social situations and environments. Therefore, one goal of MedioVis 2.0 is to develop an interface concept suitable for many different devices, which unifies all kinds of content and functionality with one consistent interaction model, while leaving the user the possibilities to establish own workflows, data structures or views on the information space.

Due to the nature of zoomable user interfaces, information presentation scales implicitly to a certain extent to different display sizes and is therefore applicable on very different hardware platforms. We currently run MedioVis 2.0 on standard desktop PCs as single user workstations, on large high resolution displays which are used as public walls to enable the work in groups or project teams and on multitouch tables to further improve simultaneous multiuser interaction (see fig. 4).

Figure 4. MedioVis 2.0 on different devices: (a) large high resolution display (3840x1080 pixel) (b) Microsoft Surface (http://www.microsoft.com/SURFACE) multitouch table.

User Experience
An additional design goal of MedioVis 2.0 is to unite all techniques and features described above in one consistent and positive user experience [15]. Besides a satisfying usability we also considered several soft factors like joy of use or attractive visual design.

As every visual design communicates associations of values and functionalities [16], we used a semi-transparent background for portals, so that contained objects are still perceptible. We also placed premeditatedly sized halos behind the genre clusters to generate visual landmarks. To improve the joy of use we chose animated zooming as interaction technique, using a sinusoidal instead of linear animation, to imitate a real world movement. The transition between different stages within semantic zooming is accomplished by a cross-fading morphing animation. Furthermore, a parallax background layer is placed behind the information landscape that zooms with a smaller factor to arouse the feeling of depth and speed.

Eventually, the design of MedioVis 2.0 encourages the explorative and playful discovery of information objects or novel functionalities during the overall navigation process in the information landscape.

Outlook and Conclusion
MedioVis 2.0 represents a novel perspective on how to implement a comprehensive Knowledge Media Workbench through the use of the zoomable user interface paradigm and object-oriented user interfaces. Thereby, information workers are able to accomplish activities within one consistent system. MedioVis 2.0 provides an unified user experience, not only on a desktop PC, but also on different devices such as multitouch tables and large high resolution displays. To further evaluate the potential of the concept, we will also transfer MedioVis 2.0 to other complementary devices like mobile gadgets (e.g. smart phones, netbooks), which already play an increasing role in creative workflows of many information workers. Reality based interaction [17] and the combination or “blending” of real world artifacts with digital information objects will also be of particular importance in our future research.

The evaluation of MedioVis 2.0’s user experience will be a further important component of the development. Therefore, we intend to organize focus groups and employ empirical studies to measure aspects such as hedonic quality and appeal.
Despite of open issues regarding the creation of knowledge artifacts or collaboration, which we want to approach in future work, we believe that our Knowledge Media Workbench – MedioVis 2.0 – offers reasonable possibilites to support an individual creative workflow.

Acknowledgments
This work is supported by Prof. Dr. Harald Reiterer (supervisor), Hans-Christian Jetter, Andreas Engl, Katharina Schätzle and the DFG-GK 1042.

References

[1] Kuhlthau, C. C. 2004. Seeking meaning: a process approach to library and information services, volume 2nd Edition. Libraries Unlimited.

[2] Shneiderman, B. 2002. Leonardo’s Laptop: Human Needs and the New Computing Technologies. The MIT Press.

[3] Karger, D. R. and Jones W. 2006. Data unification in personal information management. Commun. ACM, 49(1): 77-82.

[4] Eibl, M.; Reiterer, H.; Friedrich, Stephan, P. F.; Thissen, F. 2006: Knowledge Media Design: Theorie, Methodik, Praxis. Oldenbourg; Auflage: 2.

[5] Jetter, H.-C.; König, W. A.; Gerken, J.; Reiterer, H. 2008. ZOIL - A Cross-Platform User Interface Paradigm for Personal Information Management. Personal Information Management 2008: The disappearing desktop.

[6] Lindell, R. and Larsson, T. 2005. The Data Surface Interaction Paradigm, Theory and Practice in Computer Science, Eurographics Association.

[7] Perlin, K. and Fox, D. 1993. Pad: an alternative approach to the computer interface. In SIGGRAPH ‘93: Proceedings of the 20th annual conference on Computer graphics and interactive techniques, ACM Press.

[8] Shneiderman, B. 1996. The Eyes Have It: A Task by Data Type Taxonomy for Information Visualizations. In Proceedings of the IEEE Symposium on Visual Languages, Washington. IEEE Computer Society Press.

[9] Collins, D. 1994. Designing Object-Oriented User Interfaces. Benjamin-Cummings Publishing Co., Inc.

[10] Ahlberg, C.; Williamson, C.; Shneiderman, B. 1992: Dynamic queries for information exploration: an implementation and evaluation. CHI ‘92: Proceedings of the SIGCHI conference on Human factors in computing systems. ACM Press.

[11] de Bruijn, O. and Spence, R. 2000. Rapid serial visual presentation: a space-time trade-off in information presentation. In Proceedings of the Working Conference on Advanced Visual interfaces.

[12] Gerken, J.; Demarmels, M.; Dierdorf, S.; Reiterer, H. 2008. HyperScatter – Modellierungs- und Zoomtechniken für Punktdiagramme. M&C 2008, Oldenbourg Verlag, München.

[13] Jetter, H.-C.; Gerken, J.; König, W.; Grün, C.; Reiterer, H. 2005: HyperGrid - Accessing Complex Information Spaces. People and Computers XIX - The Bigger Picture, HCI 2005, Springer Verlag.

[14] Bier, E. A.; Stone, M. C.; Pier, K.; Buxton,W.; DeRose,Tony D. 1993: Toolglass and magic lenses: the see-through interface.

SIGGRAPH ‘93: Proceedings of the 20th annual conference on Computer graphics and interactive techniques.

[15] Kuniavsky, M. 2003. Observing the User Experience: A Practitioner’s Guide to User Research. Morgan Kaufmann.

[16] Crow, D. 2003. Visible Signs: An Introduction to Semiotics. AVA Publishing SA, Lausanne.

[17] Jacob, R. J. K.; Girouard, A.; Hirshfield, L.M.; Horn, M.S.; Shaer, O.; Solovey, E.T.; Zigelbaum, J. 2003. Reality-Based Interaction: A Framework for Post-WIMP Interfaces. CHI ‘08. ACM, New York.

This paper is the design argument of a submission to the SIDeR ‘09 Conference. The full submission, including an elaborate explanation can be found on www.sider09.com

Experiencing music through an expressive touchless interaction

J. Amoureus, O. Corduwener, M. Kelderman, J. Oomen
Department of Industrial Design, Eindhoven University of Technology
P.O. Box 513, 5600 MB, Eindhoven, The Netherlands
o.corduwener@student.tue.nl

Abstract
The Sono is a sound installation that allows people to experience and create music in a new and unique way without the traditional musical background. The focus is on creating music with an expressive interaction without touching the instrument. People can record their own speech or other random sounds and modulate the sound by moving their hand within a three dimensional field above the goblet. The installation makes use of ultrasonic sensors to detect the movement of the hand. The sensor data is linked to various sound modulation effects.

Keywords
music, touchless interaction, sensors, lights

Introduction
The development of innovative music and musical instruments is increasing rapidly [1, 2]. Where musical instruments used to express the emotions of the musician, it is time for musical instruments to be able to translate musical expressions into music. This vision lies within the philosophy of the Klankspeeltuin; the client at the start of this project. [3]

In this paper there is a new interactive sound installation presented designed to explore new expressive ways of making music. First the aim of the project will be presented in the objective, next the interaction will be showed, thisrd the technology behind the interaction will be explained and finally there will be made a conclusion from the investigation and development.

Objective
The Klankspeeltuin aims on educating children between 7-11 years old in music. They want to make children aware of music, motivate them to listen more carefully to each other, to stimulate team working and let the kids experiment and play with music. Studies also prove the benefits of music training for children [4, 5]. The Klankspeeltuin has four installations but is aiming on increasing their collection resulting in a cooperation with the TU/e and the project objective: “Design a new installation for the Klankspeeltuin that allows children to create music in a non-traditional and playful way and which stimulates teamwork”

After half a year of development the result was a musical installation based on an interaction without physical contact using an arrangement of ultrasonic sensors to track the position of the hand within a 3-dimensional field. Unfortunately the Klankspeeltuin wasn’t able anymore to financially support the project because of loss of subsidizing.

The Department of Industrial Design supported the project for further development resulting in a new project aim: to develop the concept to a high quality prototype to be presented at exhibitions as a promotional object for the Department.

Figure 1. Klankspeeltuin Concept

Figure 2. Final TU/e concept

Interaction
Aim was to create a new way of making music. Orientation within the market of interactive musical installations resulted in the conclusion that most designs focus on screens and tables and interaction through physical contact. The inspiration and room for development were found in the opposite style of interaction not relying on screens and physical contact. The Theremin [6] which makes use of a touchless interaction proved to be a strong inspiration.

In: Wouters, I.H.C.; Tieben, R; Kimman, F.P.F.; Offermans, S.A.M. and Nagtzaam, H.A.H. (Eds.)
’Flirting with the Future’, Proceedings of SIDeR ‘09, April 15-17 2009, Eindhoven University of Technology, the Netherlands.

Second aim was to make the interaction very open for various ways of creative input instead of pushing the user to a specific action. Creating music is a form of expression and people should be free in their way of expressing themselves. There shouldn't be a wrong way to use the installation.

Sound modulation

The main interaction consists of moving your hand freely within a three-dimensional field to modulate predefined samples or recorded sounds played in a continuous loop. The technique makes it able to program a large range of interaction possibilities relating specific movements to particular sounds in various ways.

Figure 3 Creating sound effects with hand movement

For example simple interaction, like moving your hand up and down to change the pitch or a complicated one using more expression, like creating wild effects with wild gestures and subtle effects using elegant moves. For the final model there was chosen for a range of three different interactions with a variety in complexity.

Feedback

Only making use of the sound effects as feedback, didn't prove to provide enough information for a clear interaction. The choice was made for additional visual feedback to provide information of the position of your hand consisting of a ring with a light that follows your hand.

Figure 4. Lights following the position of the hand 3

Light feedback was selected because it provides a clear and basic level of information and has room for a large range of feedback possibilities combining colour, intensity and position.

Record function

The record function is based on the link with an echoing well. The principle of an echoing well is that you yell inside the well and hear your voice echo. Just like an echoing well you bend over the edge of the Sono and yell your message or make a random sound. After leaning back you hear your recorded sound echoing from the Sono.

For controlling the record function the use of a physical interaction couldn't be avoided, because a non-physical interaction with hand position tracking conflicted with the sound modulation interaction.

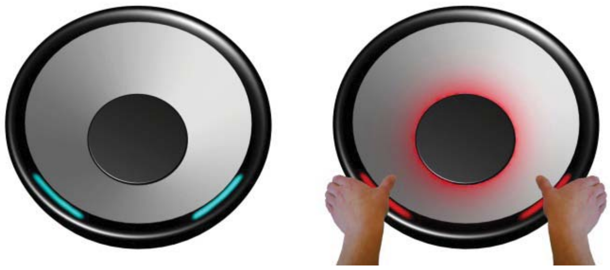

Figure 5. Switching on record function

Aiming on a subtle control related to the echoing well metaphor resulted in touching the ring while bending over to record your sound. Making use of coloured light in the touch sensitive area and the ring inside the goblet confirms switching on the record function

Technology

Sensors
SRF10 Ultrasonic Sensors measure the distance to an object by sending out ultrasonic sound waves and calculating the time between sending and the return of the reflection.

With the positioning of the sensors a three dimensional field can be created. This field is converted form XYZ field to a polar coordinate system where:
r = (x2 + y 2) ½
θ = tan-1 (y/x)
z = z

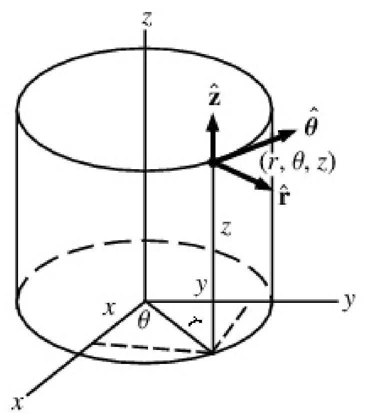

Figure 6. Cylindrical coordinates

With the polar coordinate system the sound can be changed with three values. These values can be adapted by moving your hand further away or closer to the center (θ), by changing the height (z) of your hand or by changing the angle (r) in the imaginary cylinder. These values are used in Max MSP to change the values of a patch.

Arduino
The Arduino is a microcontroller directly connected to the sensors. The data from the sensors is received and processed by the Arduino. The processed data is send form the Arduino to the computer through a USB connection. On the computer the data is being received by program called Max MSP.

Max MSP
The data from the Arduino can be translated into sound modulation effects using Max MSP, a program specifically designed for sound and musical purposes. The team was supported by Gustaaf Milzink, a student from the HKU, who designed the sound modulation programs (patches).

Sensor Positioning
Multiple tests with the sensors positioned in the three dimensional field resulted in the conclusion that registering the hand position didn't work stable enough. Tests were conducted to determine the range of the sensor beam. Main conclusion was that the range of the sensor beam covered a very narrow area between 0cm and 15 cm and covered a wide field form 15 cm.

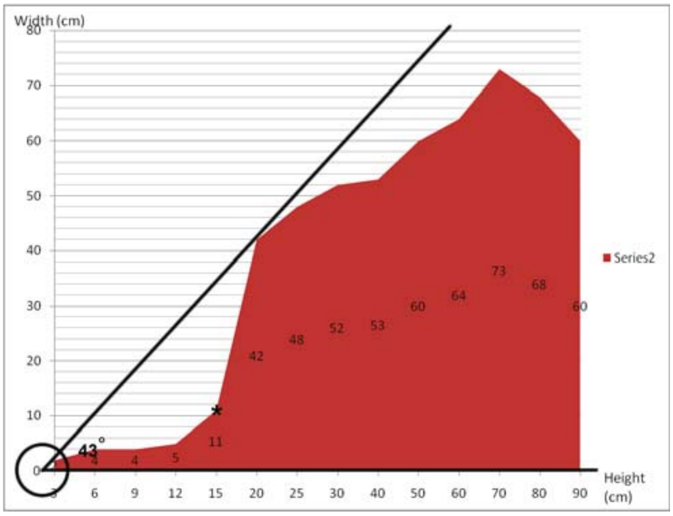

Figure 7. Sensor beam with maximum angle

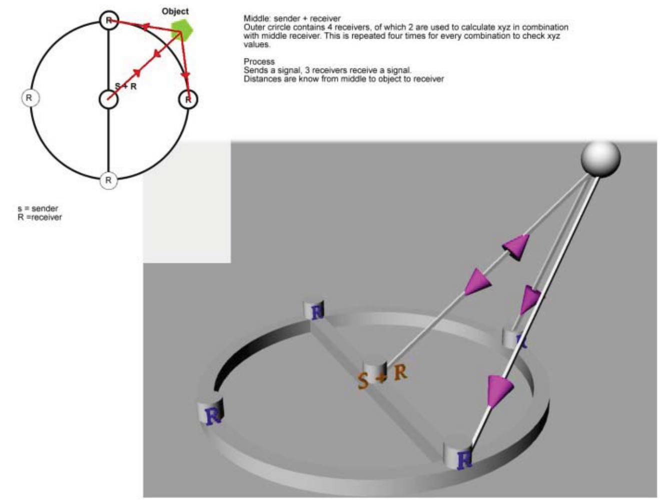

Figure 8. Sensor positioning in a ring

The options for having a single transmitter with multiple receivers were investigated resulting in a successful positioning, having one sensor including both a transmitter and receiver in the center with a circle of four receiving sensors around.

Recording
Two infrared sensors are implemented in the ring to register a person touching or nearly touching the ring to switch on the record mode.

Conclusion

Main conclusion is that the technology is thoroughly investigated and successfully implemented in such way that it provides the opportunity to create a very broad range of interaction styles. The creation of interaction options relies on programming, which makes it open for countless opportunities to be tested and implemented in the final stage of development.

The result is a sound installation which fits the demand of experiencing music in a non-traditional and playful way and also provides new chances for further exploration.

Acknowledgements

For the resources and expertise they offered in order to support and contribute to the project the authors wish to acknowledge and thank:
Department of Industrial Design University of Technology Eindhoven, Maurits de Koning, Klankspeeltuin Amsterdam, Christ van Leest, Hans Leeuw, Gustaaf Milzink, Bert Lonsain, work space employees Vertigo, HEKU Kunststoffen, HC Repair

References

[1] Manning, P. (December 2003) Electronic and Computer Music. New York: Oxford University Press.

[2] STEIM (studio for electro-instrumental music), http://www.steim.org

[3] The Klankspeeltuin (March 2006) Informatie voor begeleiders [Reader]. Amsterdam: Author

[4] Schellenberg, E. (2004). Music Lessons Enhance IQ. Psychological Science, 15 (8), 511-514

[5] Ho, Y., Cheung, M. and Chan, A. (2003).Music training improves verbal memory but not visual memory. Neuropsychology, 17 (3), 439-450.

[6] Theremin, http://thereminworld.com

This paper is the design argument of a submission to the SIDeR '09 Conference. The full submission, including an elaborate explanation can be found on www.sider09.com

Visualizing strategy, or sketching in hardware for the first time

By Pierre-Alexandre Poirier
Umeå Institute of Design, Umeå University
(0)76 14 81 14 93
pea@co-pea.com
http://experiment-all.org

Abstract
The following text is largely based on an academic project that was realized between November 2008 and January 2009. The theme of the overall project was "Complex interactions in a specialized environment" and it was conducted in partnership with Komatsu Forest AB and IDEO Munich. The goal of the project was to rethink the (very numerous) interactions that are happening between a wood-logging harvester, it's operator and the forest. Through extensive research and a total of three days spent on the field, I chose to mainly work on the operators' visual cognition.

Keywords
simplicity, low-tech, hardware sketching.

The illusion of designing interaction
As much fun as technology is, I think we should of course integrate it throughout the whole design process. However, if we do not want to risk being ourselves drowned in this sea of technology, it is mandatory that it should not be our main focus.

In an era where progress is often measured rather than appreciated—or in other words, judged by the quantity added features versus the quality of the experience—, it is my belief that as interaction designers, we should thrive for easing people's dialogue with technology. This, as I understand it, has much to do with the illusion of designing interaction.

Visualizing strategy—the project
The working environment of wood-logging harvester operators is one that can be qualified as complex if not complicated. As an example that demonstrates that complexity, let's only mention that these operators have in each hand a joystick (on which lie numerous buttons and knobs) that triggers an astounding 35 different functions! And not only are they constantly manipulating these, but within only a few seconds, they have to take an impressive amount of very important decisions concerning numerous things that are not even close to be related to the process of cutting a tree. An experienced operator can cut about three trees per minute; in other words, everything goes fast, extremely fast. In the context of a project concerning a person that works in such an intense environment—namely a wood-logging harvester—, and knowing that the main priority of the whole forestry industry (including the operators), is to increase productivity, one of the interaction designer's duties is to obviously allow that, but furthermore creating a more efficient if not more enjoyable working environment for these operators.

Figure 1. In a Valmet 941.1 wood-logging harvester, the operator looks at two things: the forest and his computer screen. On the computer screen is displayed all sorts of information concerning, amongst others, the trees (length, specie, assortment, etc.), price lists, maps, and machine settings.

The basic idea behind the 'Visualizing strategy' project is to get as much tree-related information into the forest—therefore away from the screen so that the operators can truly focus on their subject: the forest.

Before going into further detail regarding the actual concept, one has to bear in mind that due to limitations in time I have only developed in depth the micro aspects of the project: namely, an 'interface-in-action' that allows the operators to constantly keep their eyes in the forest (whereas actually, they constantly look at their screen to verify, amongst others, measurements, tree quality and specie).

Also, a critical aspect of the development of the project was to thrive for simplicity—which was in fact a self-imposed modus operandi. I tried to apply these "principles of simplicity" in: the interaction effectiveness, the visual language and the technologies I used.

Reducing by augmenting
Even if the above statement seems contradictory, while I was developing my project, it made perfect sense to me. Indeed, I figured that with my simple, low-tech approach that made use of lasers as a means of displaying information, I was if fact truly—even if crudely—augmenting reality.

I was also reducing the quantity of displayed information to the essential: the information regarding the tree specie, quality as well as a number of dots that would indicate (if there would be five of these dots) five different options to cut a log to length.

In: Wouters, I.H.C.; Tieben, R; Kimman, F.P.F.; Offermans, S.A.M. and Nagtzaam, H.A.H. (Eds.)
'Flirting with the Future', Proceedings of SIDeR '09, April 15-17 2009, Eindhoven University of Technology, the Netherlands.

All of the above information would be displayed directly on the tree trunks, with a very low-tech technology —the laser— hence my concept of interface-in-action.

Discreet choice
Another interesting thing to mention with the use of true augmented reality by means of projecting lasers beams directly onto the tree trunks (namely, having five 'dots' and a line displayed on the tree trunk) is that, contrary to the actual system which consists in the operator having to move the cutting head of his harvester approximatively to the desired location (with a pressure-sensitve knob), the operator is now discreetly indicating the exact location where the saw will cut the tree. This approximation is completely absent with my approach, for the operators need only to be pressing a single button (x number of times) depending to which 'dot' they want to move the cutting head to, hence providing a discreet input to their machine.

Furthermore, all the information needed to cut the logs to length is, as previously mentioned, displayed directly on the tree. In other words, this means that the operator, once he has set his personal preferences (e.g. the spacing between the dots that are displayed on the tree, the number of dots, etc.) would been able to constantly keep his eyes in the forest. Another interesting aspect of using such a 'low-tech' technology is that while lasers are being projected into the forest and onto the tree trunks, it means by implication that these very lasers are in fact (crudely) augmenting reality. In other words, a rather nice feature (that allows the interface to be displayed where it should be) that is often perceived as futuristic effect is achieved in a very simple manner.

Adding content does not necessarily add meaning

Simplicity… in prototyping
The term sketching, since Bill Buxton published his book , seems to have taken a much broader and more holistic meaning. It does not solely mean sketching with a pencil on a white sheet of paper anymore and that is especially true —and quite recomforting—in interaction design. Sketching, according to Buxton is, simply said, prototyping (traditional sketches, photographs, sculpture, simple electronics, etc.) numerous ideas rapidly in order to give the designer a broad range of possibilities to choose from.

As interaction designers, if we wish to not only design an illusion of interaction, but actually prototype it, it then becomes relevant to dive into the process of programming.

"Code has a major influence on design, and I think it is too important to anonymous engineers"

Building crude physical prototypes that (can) involve programming and electronics proves to indeed be an utmost hands-on method and approach to try out ideas in a relatively rapid manner. Hardware sketching—as opposed to CAD modeling or video compositing—even for a total neophyte like myself, proves to be an utterly tangible way of truly experiencing a 'design'. Not only can one see, touch or hear a prototype of that design, but can also witness, and more importantly, feel the effects and behaviors of their design.

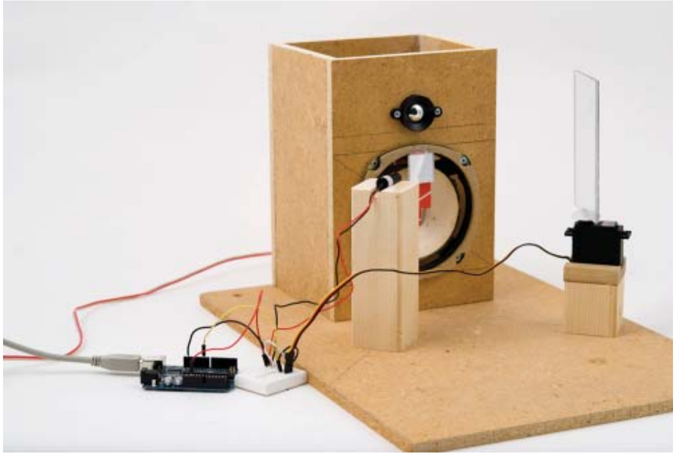

Figure 2. The final prototype of my project. It was used to validate the concept of projecting lasers.

Final words
Interaction design, when considered the other way around—that is, the design of interaction—then has an arguably different meaning. In other words, it becomes more tangible—and intelligible! More intelligible because, at least from a linguistic standpoint, the 'design of interaction' is a more concrete concept than the term 'interaction design'. Moreover, the design of interaction(s) is more revealing as to what it is that an interaction designer does: he or she designs interactions—or to use a more popular term, experiences.The interaction designer needs tools to verify, prototype, test out his or her ideas. It appears that hardware sketching is a great way to do so, partly because of it's efficiency in communicating a better idea and feeling—to the end-user as well as the designer—of the final 'experience' or interaction of what is being designed.

References
Komatsu Forest is the owner of Valmet. At least when compared to head-up displays, multi-touch screens, eye-tracking and other such technologies.

BUXTON, B. (2007). Sketching User Experiences, Elsevier, San Francisco

VAN BLOCKLAND, Erik (2007). Processing: A Programming Language for Visual Designers and Artists (REAS & FRY), MIT Press, Cambridge, p.170.

Additional references
WÄSTLUND, E. (2007). Experimental Studies of Human-Computer Interaction: Working memory and mental workload in complex cognition, Department of Psychology, Gothenburg University, Sweden.

LJUNGBERG, J.K. (2006). Psychological responses to noise and vibration, Occupational Medicine, Department of Public Health and Clinical Medicine, UmeÂ University, Sweden.

ROSCH, E. (1978). Principles of categorization in Principles of categorisation, in cognition and categorisation, Erlbaum, Hillsdale, NJ.

This paper is the design argument of a submission to the SIDeR '09 Conference. The full submission, including an elaborate explanation can be found on www.sider09.com

The Junior Director: Taking animations into the real world

Philip Mendels, Madelon de Haas, Meerthe Heuvelings, Patrick Leijte & Maartje Van 't Sant

Department of Industrial Design
Eindhoven University of Technology
Den Dolech 2, 5612 AZ Eindhoven, The Netherlands
+31(0)40-2474522
p.mendels@tue.nl, {m.d.haas.1, m.m.l.h.heuvelings, p.n.c.leijte, m.v.t.sant}@student.tue.nl

Abstract
In this paper we discuss the design of the Junior Director: This is a portable device that enables a child to record its environment along with animations that can be added and controlled in real-time. The device is suitable for children of different ages and for both independent and social play: Younger children are more likely to record interactions between animations and the environment, while older children can use their friends as actors in their movies. Important aspects relating to design for children, such as storytelling and imagination are discussed. Apart from the device itself we also describe parts of the evaluation.

Keywords
animation, augmented reality, storytelling, design for children, interactive toys, imagination, embodied interaction

Introduction
The current range of video-editing and animation software offers its users many possibilities for creating complex animated movies. This software is generally too complex for children, but moreover misses the spontaneity of play. Most animation software for children in essence does not differ much, and merely tries to make well-known slow animation methods such as frame-by-frame animation and key-framing more accessible and attractive. There are many opportunities for interaction designers for providing children with more playful animation methods. Many lie in improving software and input devices, but probably many more lie in bridging the gap between the virtual and the real world. The latter can be very inspirational, providing props, scenes and actors. Inspiration can be drawn here from fields such as embodied interaction [1], tangible interaction [2], and augmented reality.

The opportunities regarding designing an embodied animation system for children were explored in a student project coached by the first author. Four Bachelor students (the latter four authors) conducted the project during the first semester of their second year, in approximately nine project weeks (converted to fulltime). The physical result of this project is the Junior Director, a fully functional prototype of a portable device that enables a child to record its environment along with animations that can be added and controlled in real-time.

In the next section we will first discuss related work. In section 3 we will discuss the concept of the Junior Director, and in section 4 we will discuss the evaluation of early prototypes and the final prototype. We end with considerations for future work and our conclusions.

Related work
A classic example of software that uses a more playful approach to animation than frame-by-frame or key-frame animation is the game My Make Believe Castle [3]. In this game children have to draw paths in pre-illustrated scenery, drop objects on these paths, and finally place characters to start the animation. The children do not have to worry about a time-line, but mainly about the story that they want to be told. A child can for example aim to make a character slip over a banana skin while it walks over the bridge. A more exotic example is MOOVL in which children draw vector shapes that can be playfully animated using elements of physics such as gravity, friction and springs [4]. A more spontaneous way of computer animation that is closer to our concept, is the recording of computer game characters that are controlled in real-time using computer input devices. This is an important part of an art form generally referred to as Machinima [5].

For interaction designers there are many opportunities for creating new interfaces that allow animations to be used in a more embodied way. An example is the Puppet UI project in which on-screen characters can be controlled using hand gestures [6]. Other interesting things can happen when the virtual and physical world are combined. Except from the fact that the body is a natural interface, it is also magical for children to see themselves in an animation. Different contemporary examples are Sony's Eye-Toy games [7] and the Shadow Monsters project [8], which were preceded by the pioneering work of Krueger [9]. Our concept, the Junior Director, is not bound to a fixed setup and therefore compatible with a multitude of play situations. Its portability allows children to use it in different play settings, drawing inspiration from parts of the environment such as toys, friends or even buildings. It also enables children to play in different roles: Actor or director. We will elaborate on the concept in the next section.

The Junior Director
The final physical result of our project is a functional prototype called the 'Junior Director'. This is a portable device, including a camera, a screen and several controls, that enables a child to record its environment along with animations that can be added and controlled in real-time (figure 1). For example, a child can make a video of an animated dragon flying over the LEGO-castle that he or she has just built, or a video of King-Kong hanging from the real church in the street. Our current focus is not on image recognition (e.g. King-Kong will not automatically hold on to the church). The child is in control: He or she controls the actions of the animated character.

In: Wouters, I.H.C.; Tieben, R; Kimman, F.P.F.; Offermans, S.A.M. and Nagtzaam, H.A.H. (Eds.)
'Flirting with the Future', Proceedings of SIDeR '09, April 15-17 2009, Eindhoven University of Technology, the Netherlands.

Also more complex play situations can arise: A child (the director) can record movies that include one or more friends (actors) interacting with an animation. An example is a fight between a friend and an animated dragon. Since the system does not project graphics in the real world, the actor cannot see the animation. Therefore the director has to explain what is happening or what the actor should do. For example, the director can make the dragon spit out a ball of fire and at the same time s/he can ask the actor to dodge. The first time that the actor sees the recorded movie is very exciting, because now s/he can see his/her interaction with the animation for the first time. Actor and director can practice to become more skilled at making movies in which the interaction between animation and actor looks seamless. Eventually this example can lead to online contests for the most realistic or funniest dragon-fight.

Figure 1. The final Junior Director prototype being tested at an elementary school. At the left of the device is a joystick for moving the animated character. At the right are an action button, and a dial for choosing which animated character to use.

Ideation and evaluation

Ten illustrated ideas, ranging from magic mirrors to augmented puppetry systems, were developed into three concepts with illustrated scenarios. From these concepts the Junior Director was selected based on a Must-Should-Might analysis using requirements that were partly defined in the project description and partly by the students. Examples of strong points of the Junior Director are that it still challenges the children to dress up and create their own props and environments, and that it supports different ways of play (social or independent) for children of different ages.

After this choice a range of explorative prototypes was made, including amongst others a device that has to be operated by two children together and a device operated like binoculars (figure 2). These prototypes were tested at an elementary school with 1st graders and gave a first idea about the children's understanding of the concept and ability to create simple stories, related to the specific ways of interacting with the prototypes. For these young children the director-actor interaction seemed to be too difficult, but they liked making (very) simple stories of the characters moving through the environment. Especially the binoculars were a success, since they really afforded aiming (and recording) to the children. The design of the binoculars was however not used in the final concept because it can cause problems for the director in terms of moving around and communicating with the actor.

Figure 2. Explorative prototypes with paper characters that can move along translucent plastic instead of animations on a screen.

The final prototype was later tested with 6th graders. First impressions show that the children have lots of fun playing with the final prototype. There was much interaction between the actor(s) and director. They were actively discussing the play/scene before, during and after recording.

Future work

Extensive usertests were not possible within the timeframe of the project. Longer tests with more participants has to be done to get more insight in the richness of stories and interactions that children of different ages create with the device. It is important to test the device in different play settings, such as social play at school or independent play in a child's room.

It will be necessary to investigate the different kinds of actions that the animations allow for, and how to improve the interface for controlling these actions. This is extra important because the director should not only be able to control the animations, but at the same time also film the scene and communicate with the actor.

Finally, different kinds of animations can be developed allowing for a wider range of interactions and stories. Eventually it can also be considered that children create their own animated or non-animated characters.

Conclusion

An important learning point from this project is the inspiration that the real environment has to offer, not only for the children for storytelling, but also for us as designers in coming up with innovative concepts. We encourage interaction designers in general to consider their designs within real-world contexts. When designing for children, their natural play settings, props and roles can be used as an important part of a design concept. By considering different scenarios that require different amounts of imagination and social interaction, a design can be made suitable for children of different ages.

What surprised us was that it was hard to find examples of closely related work. There are lots of examples of augmented reality applications (also for portable devices) in which animations adapt automatically based on detecting features or movement in video images, but not of cases in which the 'director' has more precise control over what happens. We are definitely not arguing that children do not like animations that react automatically (we are sure they do), but do think that it can be worthwhile to explore more augmented video concepts that trade some system intelligence for more creative control.

References

1. Dourish, P.: Where the action Is: the foundations of embodied interaction. MIT Press, Cambridge, MA (2001)

2. Ullmer, B., Ishii, H.: Emerging frameworks for tangible user interfaces. IBM System Journal
39(3-4), 915–931 (2000)

3. My Make Believe Castle. Computer game. Published by LCSI. URL: http://www.microworlds.com/solutions/mmb.html

4. MOOVL. Interactive web application by Ed Burton. URL: http://www.moovl.co.uk/

5. http://www.machinima.com

6. Fatland, E. and Li, X.: The Puppet UI: Tools for nonverbal communication in virtual environments. Available online at: http://www.efatland.com/portfolio/puppetUI/PuppetUIpaper.pdf

7. Sony EyeToy. URL: http://www.eyetoy.com

8. ShadowMonsters by Philip Worthington. URL: http://www.worthersoriginal.com

9. Myron W. Krueger , Thomas Gionfriddo , Katrin Hinrichsen, VIDEOPLACE—an artificial reality, Proceedings of the SIGCHI conference on Human factors in computing systems, p.35-40, San Francisco, California, United States (1985)

This paper is the design argument of a submission to the SIDeR '09 Conference. The full submission, including an elaborate explanation can be found on www.sider09.com

Waiting as Part of the Fun: Interactive Gaming in Theme Park Queues

Chris Heger, Serge Offermans and Joep Frens
Eindhoven University of Technology, Department of Industrial Design
P.O. BOX 513, 5621MB, Eindhoven, the Netherlands
{ c.j.j.heger, s.a.m.offermans }@student.tue.nl, j.w.frens@tue.nl

Abstract
People visiting theme parks intend to have a day of fun. Yet a larger part of the time is spent queuing for rides rather than in the actual rides, which does not contribute to the intended fun experience. Current efforts therefore either make the queue as bearable as possible or try to get rid of it altogether.

In this paper we propose a vision in which we see the queue as an opportunity to become part of the fun experience of visiting a theme park. To realize this vision, we propose the use of interactive gaming platforms interwoven in queue, on which people in line can play a game that is based on several psychological principles to shorten the perceived waiting time. We present a design-case; 'the Dream Chamber' as an example of our vision. Evaluations of this system indicate potential for this class of systems and our proposed vision.

Introduction
In amusement- and theme parks, visitors buy a ticket to spend a fun day with their family or friends. However in today's crowded parks, a large part of the daytime is spent on queuing for the rides. Instead of the intended fun, this often results in annoyance and frustration.

General attempts have been made to overcome the problem of waiting in theme parks. Some projects aim to make the waiting as efficient as possible by the use of waiting management systems such as "Six Flags' Q-bot" and "Disney's Fast-Pass". Others aim to make the waiting more bearable by providing entertainment such as atmospheric environments, actors dressed as fantasy figures, videos, animatronics, etc. Some theme parks also use other entertainment to increase capacity and to take away pressure of the waiting lines, such as large theatre shows, restaurants and museums.
Disadvantages to these approaches include: (1) that waiting management systems only relocate the waiting but do not tackle the waiting itself, (2) that the current entertainment provided is fine in principle, but is very passive and usually does not entertain people for the duration of the wait.

Figure 1. Two photographs of the queue for the ride 'Droomvlucht' the theme park 'de Efteling'

The conclusion we drew is that the problem of waiting in theme parks has not yet been solved in a satisfying manner. Furthermore we believe waiting in theme parks is inevitable. Theme parks have under-capacity by default, which naturally results in people waiting for rides (in whatever form). From a business perspective queues are even considered desirable as they help theme parks to live up to their promise to provide visitors with a full day of fun. Finally, waiting in line contributes to increased anticipation for the rides, especially when you can have sneak previews of the ride while waiting for example a roller coaster passing by over your head.

Proposal

Vision
We propose a new vision on queuing. We see an opportunity to extend and amplify the fun experience of visiting a theme park by making the wait part of this experience. This opportunity is created by the nature of the queue which consists of: (1) a large number of people that (2) are waiting for the same entertainment and who have (3) time to engage in an activity. Creating a fun activity, tailored towards the ride, can exploit this rare opportunity to achieve the extended and amplified fun experience. Thereby the general visitor satisfaction of the park increases, resulting in better reviews of the park and more returning visitors.

Background theory
To realise our vision, we propose the implementation of several psychological principles in an interactive system in the queue area. We used three psychological principles described by David Maister in his paper 'The Psychology of Waiting Lines' [3], that either increase the tolerance for waiting time or reduce the perceived waiting time.
(1) Activity. When people have something to do, their perceived waiting time is shortened.
- We aim to provide people with an activity related to the service they are queuing for.
(2) Feeling of progress. When people feel they are progressing towards their goal, their tolerance for waiting time increases. When people feel the service has already started, this feeling of progress is further amplified.
- We aim to provide people with a game that becomes harder and harder when people move forward in the queue to create a feeling of progress. We aim to amplify this feeling by designing the game in close relation to the ride people are queuing for.
(3) Group feeling. Waiting on your own seems longer than waiting with a group of friends. When there is a feeling of 'group' the perceived waiting time is shortened.
- We aim to make people cooperate to create this feeling.

In: Wouters, I.H.C.; Tieben, R; Kimman, F.P.F.; Offermans, S.A.M. and Nagtzaam, H.A.H. (Eds.)
'Flirting with the Future', Proceedings of SIDeR '09, April 15-17 2009, Eindhoven University of Technology, the Netherlands.

Design Case

Here we present a design for the queue area of ride in the dark called 'Droomvlucht' (Dream-flight) in theme park the 'Efteling' in the Netherlands. In this fairy-theme ride people are taken through several dream-worlds in 2-3 person carriages.

Dream Chamber concept

For the queue area of this ride we propose to implement a collaborative tabletop game, played on interactive tables that are interwoven in the queue structure. On these tables the people in line can play a game that matches the ride's theme of fairies and dream-worlds. We call this gaming-system 'Dream Chamber'.

Figure 2. The tables interwoven in the queues snake-structure

The goal of the game is to 'feed' the ride's dream-world with 'dreams' in order to keep it alive. The people in line have to work together to accomplish this task by guiding 'dreams' with their hands from one end of the table (where they emerge from the 'dream source') to the other end of the table where the 'dreams' are collected by an elf in a crystal ball. When the crystal ball is fully charged the elf sends the dreams from his ball towards a typical scenery that represents the dream-worlds of the ride. The more dreams that reach it, the more vivid and lively it becomes, making it a representation of how well people are playing. On a local level, the elf's crystal ball supplies this representation.

Figure 3. An illustration of the queuing area as proposed for 'Droomvlucht'

As people progress through the queue the game becomes more difficult. Each table presents them with increasingly challenging levels until they eventually reach the actual ride. When people enter the line, they start off with simple levels to explore the game. In later levels they have to avoid 'dreams' colliding with 'nightmares' that eliminate the dreams. To continue feeding the dream-world they will have to work together to guide the dreams safely across the tables.

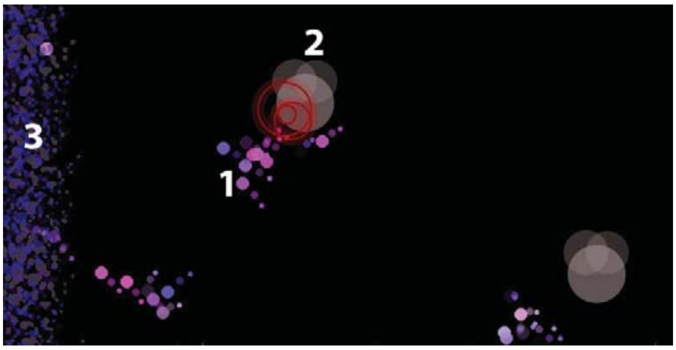

Figure 4. The game with the different elements; 1) Dreams; 2) Nightmares; 3) Dream source

Interaction

When entering the 'Dream Chamber' people receive a ring to put around their finger. This ring allows for recognition of the in- and outside of the hand by the system. Depending on the position of the visitor's hand above the table's surface, one of two types of interaction with the 'dreams' is used. With the palm of the hand facing up, the visitor can make an inviting gesture to attract the dreams. With the palm facing down, the visitor makes a blocking gesture to push the dreams away.

Each dream is in essence a particle which behaves according to the flocking principle [1]. This gives the dreams a natural emergent behaviour, similar to that of a flock of birds. When interacting with the dreams the people influence the 'dream particles' as a part of the flock but with a bigger force than the dreams have on each other. This gives people an influence on the dreams, but no control over the dreams. Cooperation with other people in line is therefore required to guide the dreams. The natural behaviour of the dreams and the two types of interaction create an intuitive way of playing the game and make it easily understandable for different users.

The wide variety of people in theme parks and their expectations requires the game to allow for a variable level of engagement in the game. The setup of the tables creates a continuous interaction platform which allows people to decide whether or not to interact with the game at each point in the queue. This means that children may play intensively for the duration of the wait, their parents may help out every now and then and they may take a break to have something to eat whenever they please.

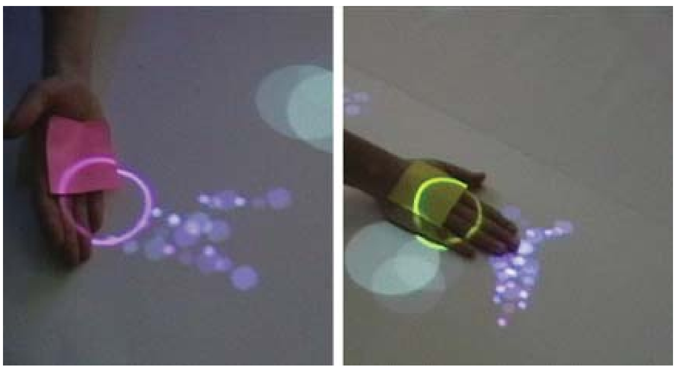

Figure 5. The Interaction possibilities with the game; pull (left) and push (right). In our prototype we used coloured stickers for hand-tracking instead of the proposed rings

Evaluation and Conclusions

Setup
To evaluate our proposal we created a prototype of the Dream Chamber concept. This prototype consists of a two meter long table that represents a small part of the larger interactive table system interwoven in the queue structure.

The prototype uses a video projector to project the game and a webcam to track people's hands. Instead of the infra-red ring described in the concept, we used coloured stickers to track hands.

Procedure
We evaluated the proposal in two qualitative user-tests at our department of Industrial Design at the Eindhoven University of Technology. One test was conducted with approximately 150 high school students (divided over groups of 15-25 people). They were asked to play the game. Afterwards they filled in a questionnaire in which they were asked about the use of such a system in a theme park context.

The second test was performed with an expert panel that consisted of eight staff-members and master students of our department. During this heuristic evaluation, the quality of more specific elements such as interaction, game-play, graphics and sound were discussed.

Figure 6 Photograph during the test with the expert panel

Findings
In general we can say that the concept triggered positive reactions in both testing groups. We can however not draw rigid conclusions concerning a successful implementation of the psychological principles (activity, progress, group feeling), as we were only able to evaluate the system outside the actual context. Nevertheless, from the observations of the tests, we got indications that we have succeeded in making these principles work.

We observed that most people were actively involved in the game for the duration of the experiment. This indicates that we have been able to create an 'activity' for the people in line.
We also observed that people who did not know each other cooperated and communicated strategies to guide the dreams in the right direction. This may be and indication of a basic 'group feeling'.

Creating a 'feeling of progress' was hardest to assess outside the real context. We have however been able to observe increasing skill of the participants over time as they reached the higher levels of the game. This increased skill may be felt as progress. People also indicated they saw a clear relation with the ride. This can make them feel the service has already started which also promotes the feeling of progress.

Considering the interactions, people were able to understand the interaction possibilities after a few moments of getting acquainted with the system. The capability to use the possibilities efficiently varied per person, but generally grew over time.

Discussion

Future work
In order to draw validated conclusions, an in-context longitudinal field study should be performed to learn about the actual implications of the proposed system on the queue and the people waiting in it. Only then can we answer relevant questions like: will waiting truly become part of the fun experience of visiting a theme park? Will the tolerance for waiting time be increased and the perceived waiting time be shortened? Will the same social rules still apply or does the design change the queuing ethics? [4] What will be the influence of people who interfere with the game's goals?

Also the possibility of developing different games for different rides needs to be investigated. This could be done both by exploring the implementation of the proposed interactive table platform for different rides and queues, as well as on other -yet to be developed- platforms.

Future of waiting in theme parks
It is likely that interactive entertainment will play an increasingly important role in theme parks over the years to come [2]. Interactivity in the rides is an opportunity which is hard to leave aside, as new technologies emerge and are available at relatively low costs. Visitors will become actively involved in the ride and help to shape their own, relatively unique experiences.

When the rides become increasingly interactive, interactivity in waiting areas is in our vision a logical next step. Actually, it is a step that may go prior to the shift in focus in the rides as the desire for a change is more urgent in this area. In our vision, a day in the theme park of the future is no longer one where a lot of time is spent waiting for pre-fab experiences; but rather one where a whole day is filled with fun activities.

Acknowledgements
We would like to thank Sietske Klooster for her support and inspiring thoughts during the project. Furthermore we would like to thank all people who participated in our user tests.

References

[1] Boids (Flocks, Herds, and Schools: a Distributed Behavioral Model). [online]. [s.l.: Craig Reynolds], [Cited: December 26th 2007]. Available from World Wide Web: <http://www.red3d.com/cwr/boids/>

[2] Jones, C.B.; Robinett, J. The future of Theme Parks in International Tourism, ERA issue paper, Economics Research Associates; 1995. p. 1.

[3] Maister, D.H. (1988), "The Psychology of Waiting Lines", in Lovelock, C.H. (Eds),Managing Services: Marketing, Operations, and Human Resources, Prentice-Hall, Englewood

Cliffs, NJ, pp.176-83.

[4] Rafaeli, A.; Barron, G;, Haber, K. The Effects of Queue Structure on Attitudes, Journal of Service Research 2002; vol. 5, p. 125

This paper is the design argument of a submission to the SIDeR '09 Conference. The full submission, including an elaborate explanation can be found on www.sider09.com

An In Your Face Interface: Revisiting Cyranoids As A Revealing Medium For Interpersonal Interaction

Robb Mitchell
IT Product Design, University of Southern Denmark
robbathon@gmail.com
www.egomassage.tk

Abstract

This paper reports upon an ongoing investigation exploring a provoking concept in interpersonal interaction. The origins of the concept of human conduits or cyranoids as a tool of deception is outlined. Informal exploration of the technique in social settings is described. It was discovered that a participatory unveiling of the illusion might accelerate the formation of positive new interpersonal relationships. A follow up trial in a workplace setting probed if the technique had potential as a medium of business communication. Reflections upon the difficulties of accurately relaying emotions through a human conduit conclude the paper.

Introduction

Cyranoids are people whose speech is being controlled by another person (Milgram 1984). People that converse with a cyranoid may thus experience an illusion that they are interacting with the person in front of them whilst in a sense they are only interacting through that person.

It is hoped that an exploration of cyranoids can contribute to and provoke discussions in a range of theoretical and practical fields relating to interaction design, including the development of embodied agents, voice activated systems, humanoid robotics, augmented cognition, remote collaboration, social media, cyber-ethics and telepresence.

Researchers concerned with the methods of prototyping other complex devices and systems may also care to reflect on how a cyranoid is a kind of subversion of the “Wizard of Oz” technique (Kelly 1983). “Wizard of Oz-ing” uses a concealed experimenter as an inexpensive and rapid method to simulate the behaviour of an interactive application or device. In contrast, a cyranoid can be seen as using a non-concealed person (who may or may not be experimenters) in a simulation of product behaviour for which we have widely available technology.

Cyrano the first cyranoid

The term comes from the character Cyrano de Bergerac in Edmond Rostand’s 19th Century play (Rodstand 1898). Cyrano, who is ugly but articulate, helps his handsome but inarticulate friend win the heart of Roxane by providing eloquent and witty prompts from the sidelines. The outcome is that Roxane falls in love with Cyrano’s mind through interacting with the body of his friend. Although this intriguing plot has been explored in numerous plays and films since the 19th Century, there has previously only been one attempt to explore this idea outside of fiction.

Stanley Milgram and 20th Century Cyranoids

Social psychologist Stanley Milgram coined the term cyranoid to describe a person whose utterances were being controlled by a second person, the source, via radio transmission (Milgram 1984). The cyranoid wears a headset which receives input from a microphone in a different location. The source then speaks into the microphone, and the cyranoid just has to repeat to their interactants what they hear in their ear. So that the source knows what is going on, the cyranoid also wears a microphone which transmits everything it hears back to the source. In this way one person can control the utterances of another unbeknownst to other people.

Cyranoids in the age of ubiquitous computing

Since Milgram’s work, little has been done in this area[1], and yet, today with advances in technology the time is right to explore a more advanced version of the cyranoid. While the headsets used by Milgram were conspicuous and limited to transmitting verbal data, now, it is possible to use incredibly inconspicuous equipment to transmit both verbal instruction and for the source to also receive a video stream of what the cyranoid is seeing. Furthermore, the internet means that the cyranoid and the source can be separated by huge distances, with sources simply ‘logging in’ via the web to a given cyranoid, being able to see and hear what the cyranoid hears and sees, and then being able to transmit thoughts to, and through the living, breathing avatar that is a cyranoid.

Experiments in Social Settings

To explore and verify Milgram’s claims, two trials of cyranoids were undertaken in the social setting of exhibition launch events at two different art galleries. In both cases there were three unannounced cyranoids mingling with the unknowing guests. The trials took place in different towns, thus the guests attending the events were largely unfamiliar to all three cyranoids.

An obvious and two discrete cyranoids

One of the cyranoids wore their camera, microphone, transmitters, receivers and power sources and all connecting wires on the exterior of incongruous headwear.

[1]*The focus of this ongoing inquiry is on the interpersonal effects of a single source in turn conversing through a cyranoid that is colocated in time and space. Related explorations include democratically controlled tele-actors (Goldberg 2002) whereby many sources vote online to control the actions of a tele-actor and artworks in which living avatars are remotely directed to interact with other living avatars (Butler 2007).*

In: Wouters, I.H.C.; Tieben, R; Kimman, F.P.F.; Offermans, S.A.M. and Nagtzaam, H.A.H. (Eds.)
’Flirting with the Future’, Proceedings of SIDeR ‘09, April 15-17 2009, Eindhoven University of Technology, the Netherlands.

Figure 1. The obvious cyranoids from the two social settings trials

In the first trial this “obvious” cyranoid wore a straw hat and in the second trial, a skateboarding helmet (Fig. 1). The other cyranoids wore hidden video cameras and very discrete earpieces similar to those used by secret service personnel.

Procedure
In both experiments the cyranoids were controlled by an evolving cast of sources sitting in a hidden control room (Fig. 2). The initial sources that controlled the cyranoids were drawn from the staff of the venue. After interacting with one or more cyranoids, dozens of guests were discretely invited to the control room and given the opportunity to have their words relayed by a cyranoid themselves (some video and audio available). The duration of the trials were 2.5 hours and 4 hours respectively.

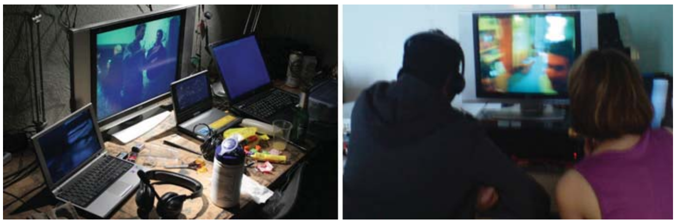

Figure 2. Control rooms where the sources sat in order to transmit words to the cyranoids

What happened
In brief, the illusion in interaction reported by Milgram was very much found to be feasible. These trials however went beyond Milgram’s use of deception. The revealing and rotating of interactional roles allowed guests to participate in the creation of the illusion which enabled a much fuller range of observations as follows.

It was startling, that despite the visible clues offered, almost no guests figured out that the cyranoids were repeating the words of hidden sources in the control room. Particularly surprising was that the hat wearing cyranoid, although considered eccentric and/or socially clumsy was perceived as speaking their own thoughts just as much as the the subtle cyranoids were. It appeared that interactants cannot independently conceive of a cyranoid as being anything other than a single speaking person.

The guests that experienced being a source, in general had a very enjoyable experience, isolated as they were from the confusion and occassional anger of interactants and embarassment experienced by cyranoids. It was anticipated that cyranoids might be utilised by sources as a means to say things to strangers that they might normally feel restrained from doing. However, in both trials, sources overwhelmingly chose to interact with their friends through the cyranoid, rather than strangers. Indeed, sources were often tongue tied when talking to strangers that they were unfamiliar with.

When the interactants knew that they are talking to a source through the cyranoid, rather than just experiencing an odd interaction, the interactants became much more relaxed and conversation was both more reflective and playful.

Figure 3. When interactants were aware that they were talking through, rather than to the cyranoid, they become much more relaxed.

Groups of interactants conversing with a friend through a consensual cyranoid appeared to much more succesful and happier experience for interactants than “one-on-one interaction”. For example, such interactants frequently enjoyed a shared joke concerning differences in physical appearance, gender, accent between the cyranoid and their friend in the control room. Groups of interactants engaged in consensual cyranoid interaction with a friend as source also brought unforeseen benefits of social inclusion for the cyranoids. Even though it was often the first time that they had encountered any given source and group of interactants, the cyranoid felt very rapidly to be part of their social group.

If, a cyranoid could very rapidly have a sense of belonging to a social group, then this raises the possibility that the technique could also be used professionally to accelerate integrating workplace team members in, and between remote locations. In order to explore if a cyranoid meeting can be a productive meeting, an opportunity for a workplace study was pursued.

Workplace Experiment

An opportunity arose in connection with three academics who were due to meet to discuss the formulation of their unit’s research strategy. However, the senior academic became unable to travel to the university for the scheduled meeting. At short notice the cyranoid technique was deployed in the form of a masters student attending the meeting as his conduit.

Audio & video set up
The source’s speech was transmitted to cyranoid by landline telephone. For this purpose the cyranoid wore a standard office worker hands-free wired headset. The audio of cyranoid and interactants was picked up by a quality table mounted microphone and monitored by the source via a popular free VOIP service.

The built in camera on a netbook PC held in the lap of the cyranoid provided the source with a video feed of the two interactants. The source could not see the cyranoid and neither the cyranoid nor the interactants could see the source. The meeting was documented by a separate single video camera positioned to the side of the cyranoid and interactants (video available).

What happened
The meeting contained many moments of laughter from all parties, particularly in the early stages. The relaying of the source’s laughter by the cyranoid appeared to create a ripple effect whereby it would infect the interactants with laughter.

As the meeting progressed, the source adapted their speech to suit the capabilities of the mediuam and the cyranoid acquired much greater fluency relaying the source's words. One of the interactants made little eye contact with the cyranoid, instead they looked at the microphone a great deal.

Fig. 4 There was much laughter at the beginning of the meeting, before interactants (seated centre and right) became oriented to the medium of the cyranoid (seated left).

Feedback from workplace setting
Following the meeting all four participants were semi-formally and separately interviewed about their experiences and observations during the encounter.

Interactants and sources ascribed their laughter during the trial to many different causes. These included "embarassment", "unusual experience" and "humorous delays" - for instance the cyranoid "looked like they were taking a longtime to think for very simple and understated responses". The cyranoid relaying the laughter of the source was reported to be a "very eerie" effect which also in itself provoked further laughter.

As the source and one of the interectants reported, they "got used to" the unusual format of the meeting. The source felt that the business of the meeting was accomplished as quickly as it may have been if via a standard webcam link: "*We got enough done*".

The delay between the source transmitting words and the cyranoid relaying them was a source of great amusement initially but it was a phenomenon that over time, the interactants orientated themselves to. As one said:

"*it was a bit like when you start teaching and you wait for students to respond to a question that is not addressed to any of them in particular. You get used to waiting longer than you think you should at first*".

Several participants commented that for certain parts of the meeting the delay may have helped promote more reflective and thoughtful viewpoints. In any case, all parties commented upon how the interactants took a more active role and talked to each more than they may have if the source was present.

One of the interactants felt that conversational turntaking followed more natural patterns in comparision to a non-cyranoid webcam conference. That the remote participants words were being relayed "as clear and as present as someone else's voice in the room" rather than "tiny laptop speakers" was also reported to be a positive feature by one of the interactants.

The cyranoid felt very involved with the unfamiliar topic of discussion and had a sense of belonging that went far beyond what they would have expected if they were merely an observer at a meeting.

Discussion
The difficulties experienced by the interactants in relation to the relaying of the source's laugh during the workplace trial points to a somewhat counterintuitive hypothesis: namely, that on the basis of these limited explorations, a human relay may cause more disruption to human interaction than a machine relay.

A "basic building block" (Hatfield & Rapson 1998) of human interaction is emotional contagion – the means by which people subconciously mimic and synchronise each others' non verbal communication and aspects of their vocalization. Studies have suggested that such cues may also be tranmitted through telephone and computer mediated communication (Hancock 2008). However a human relay in the form of a cyranoid appears likely to block emotional convergence between source and interactant as the signals will be modified by the cyranoid's own emotions, language and body.

A cyranoid may attempt to faithfully relay the emotional qualities that they hear in the source's voice but it appears highly unfeasible that they may achieve this. To wholly and reliably relay the emotions of the source would require the cyranoid either to completely remove their own emotions from the interaction and/or completely synchronise their own emotions with that of the source. Outside of hypnosis, neither options appears remotely plausible. Although other mediums may diminish emotional contagion, the difficulty with a human relay is that the filtering, or indeed, amplification of emotion, whether deliberate or unintentional, is much harder to identify.

Marshall Mcluhan wrote that "every extension is an amputation" (Mcluhan 1962). The explorations described above illustrate this vividly: the cyranoid and source may have their mutual senses of empathy increased and the source may feel a degree of capability to act and interact at a distance, but these "extensions" are at the expense of disrupting the emotional contagion experienced between most parties.

As an exercise in group formation, the medium also involves trade-offs between advantages and disadvantages. The cyranoid and source combination may create for those participants, a sense of "us", but only by delineating a contrasting "them" in the form of interactants. The cyranoid and interactants may similarly experience a sense of "us" by virtue of their having a co-located dialogue in contrast to the less present source.

Mcluhan's warning can also in a sense be applied to researching technological attempts to improve interpersonal interaction. Each time a technology system is extended to involve an additional person, the complexities of evaluating the impact of the system are multiplied. A cyranoid interaction involves novel and multi-locational forms of relating which can cause confusion even amongst participants that are very familiar with each other.

However, such confusion also points to the value of cyranoid investigations as a means to explore interpersonal communication since unlike a telephone or an instant messaging service, a cyranoid may themselves deliberately influence, reflect upon, question and discuss the interaction that they facilitate.

Future Work

The possibility of a cyranoid enabled "speed dating" event is being explored with potential partners from the hospitality industry. Opportunities to deploy cyranoids within a conference environments may prove revealing. In addition to acting as a possible social catalyst between previously unacquainted conference attendees, cyranoids also have the potential to allow those unable to travel to a conference a sense of remote, but active participation.

Conclusion

The positive interpersonal interactions and sensations generated by these limited trials are encouraging, but it is as yet unclear how much these positives are due to contextual factors such as the specific personnel and situations in which they have been deployed. Further work with richer documentation, rigorously analysed may yield further understanding of what cyranoids can tell us about people and interpersonal interactions, and of how such understanding can be applied.

Acknowledgements to Alex Gillespie, Brian O'Neill and Flora Cornish for the collaborative development of the initial trials which were supported by Six Cities Design Festival, Fife Contemporary Arts, St Andrews and Generator Projects, Dundee. For the later work, the good humoured support of faculty members of the Design Studies Studio at the SPIRE Centre for Participatory Innovation is also acknowledged.

References

Butler M (2007) Mediamatic - The Girlfriend Experience. http://www.mediamatic.net/page/13553/en. Accessed 18 January 2009

Goldberg K, Song, D, Khor, Y, Pescovitz, D, Levandowski, A, Himmelstein, J, et al (2002). Collaborative Online Teleoperation with Spatial Dynamic Voting and a Humanond "Tele-Actor". Proc IEEE International Conference on Robotics and Automation, Washington, DC, USA

Hatfield E. & Rapson R (1998) Emotional contagion and the communication of emotion. In M. Palmer T. & Barnett G.A. (Ed.), Progress in Communication Sciences, Greenwood, Westport, CT, USA

Hancock, J.T., Gee, K., Ciaccio, K., and Lin, J.M.H. (2008) I'm sad you're sad: emotional contagion in CMC. Proceedings of the ACM 2008 conference on Computer supported cooperative work, ACM New York, NY, USA

McLuhan, M. (1962) The Gutenberg Galaxy. University of Toronto Press, Toronto, Canada.

Milgram S (1984) Cyranoids. In meeting of the American Psychological Association, Toronto, Canada. Reprinted in Milgram S (1994). The individual in a social world. McGraw Hill, Columbus, OH, USA

Rostand, E Thomas, G, & Guillemard MF (1898). Cyrano de Bergerac: A Play in Five Acts. RH Russell, New York, NY, USA

This paper is the design argument of a submission to the SIDeR '09 Conference. The full submission, including an elaborate explanation can be found on www.sider09.com

Exploring Interactions in a Public Toilet

Aditya Pawar
MSc. Design for Interaction, Department of Industrial Design Engineering, Delft University of Technology
Landbergstraat 15, 2628 CE Delft, The Netherlands
apawar@student.tudelft.nl

Abstract
This paper discusses the design and role of public toilets in today's society. It shares the process of design for a hypothetical public toilet for the Efteling, Netherlands, for which two concepts have been proposed.

The concept focuses on a solution for claustrophobic toilets, which are a result of shortage of public space in cities and the social context. The concepts also touch upon the spatial nature of privacy and the community role of public toilets.

Keywords
Public toilets, Interaction Design, Privacy & Space, Community Architecture.

Introduction
It is seen that with the shrinking of cities a general lack of space prevails. This also has its bearings on the design of public toilets. This results in an inconvenienced experience for a toilet goer, weather it is in terms of claustrophobia, awkwardness with strangers in the toilet or issues of privacy and hygiene.

This project was initiated as a proposal to the Efteling (an attraction park in the Netherlands) for a redesigning of the toilet experience there. The design process started with research with a focused user group – children, and went on to examine the interaction with adults and visitors of the Efteling. The paper is divided into research, research findings and the two final concepts.

Research
The initial stage of the design was started with a generative session with children aged 6 to 12 years. The exercises included a sensitisation workbook that the children were to fill the week before the session. The start of the session had a 'draw your dream loo' exercise with discussion of the sensitization booklets intermittently. In the second half of the session the children were handed a bunch of 'happy' and 'sad' faces on post-its which they used to express their dislike or liking for objects/ spaces in the loo. Later, they refurbished the parts they had marked as being unhappy.
An example of the refurbished idea (fig 1) was a 'character based flush', which the concerned boy said was like a friend in the loo. Another example was of a 6 year boy wanting a camera to see everyone entering the building.

The second stage of the research aimed at getting feedback on problems that people faced in general in the Efteling toilets, with an emphasis on their emotional experience (fig 2).

Figure 1. Generative session with children and the refurbished flush.

Figure 2. Interviews in situation (Efteling). Use of emoticon based cards for interviews

This exercise gave a realistic picture of the habits of 'people clusters' visiting the Efteling. For example a group with 5 children had to go to the loo most often as each child would want to go to the loo only at the last minute, the nursing mothers preferred to use the handicap loo as it was bigger and could fit a pram, the younger boys used toilet cubicles instead of the urinals for ergonomic reasons, children often spoke to their parents from inside the cubicles to assure them of their presence. Often people had to wait for a member if he/she had to go to the loo. All such factors were recorded and used in generate concept ideas.

Research findings
The recorded sessions and interviews were made into transcripts and additional field observations added to them. The transcripts were divided amongst the researchers and statements and insights sorted individually (by way of statement cards); these were later brought together (triangulation exercise) and clustered into prominent subthemes. The resultant info graphics was a map of relevant feelings, concerns and behaviors in the interaction between people and people, people and objects, people and environment in context of the Efteling loo (fig 3). In addition, five basic stereotypical visitor clusters of Efteling were identified and represented as 'group personas'.

In: Wouters, I.H.C.; Tieben, R; Kimman, F.P.F.; Offermans, S.A.M. and Nagtzaam, H.A.H. (Eds.)
'Flirting with the Future', Proceedings of SIDeR '09, April 15-17 2009, Eindhoven University of Technology, the Netherlands.

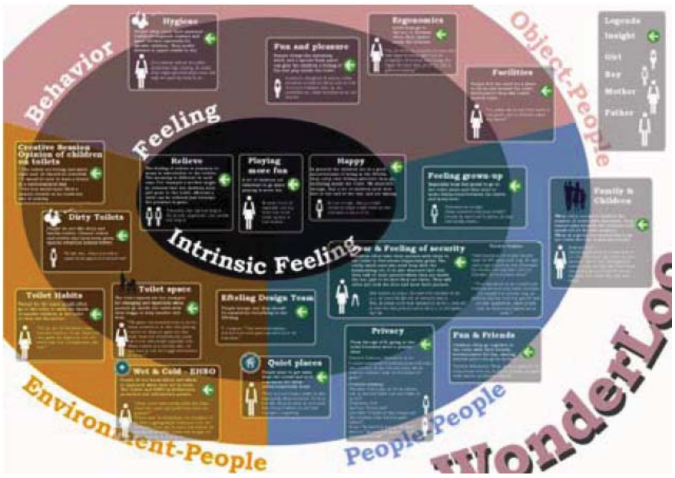

Figure 3. Info-graphics for the toilet interaction system.

Out of the interactions mapped, a few problem areas came out as being quite widespread, these were picked up to be worked on. The concerns chosen included the feeling of claustrophobia, fear and a feeling of insecurity (especially for children), awkwardness with strangers, waiting queues and the underlying privacy issues.

Concepts

Concept 1: Permeable Space
The concept aims at removing the feeling of claustrophobia by proposing a virtual expansion of the space in the loo (fig 4). The loo wall is sensitive to human presence and movement, and goes transparent (invisible) at the spot a person is standing. The more the number of people inside the loo, the more transparent its walls get (http://www.youtube.com/watch?v=jBzc9YoKB9Q). This results in a virtual expansion of space (arising from this permeable vision). An evaluation session indicated that giving a 'real time' transparency effect would compromise privacy. Rather, an element of play needed to be added to the concept so as to be perceived as simulated and not compromise the users' sense of control over their surroundings. One of the concept iterations suggested in the sessions was the adding of sightings of Efteling creatures to this vision effect. But the characters that the users suggested were too stereotypically gender specific (the boys wanted dragons, the girls princesses and ponies). In the final concept, to preserve the feeling of privacy the effect of transparency occurred with a seasonal time gap - if it was summer, it would show the scene outside as being winter.The footage seen outside by this effect is taken from the security camera archives of Efteling.

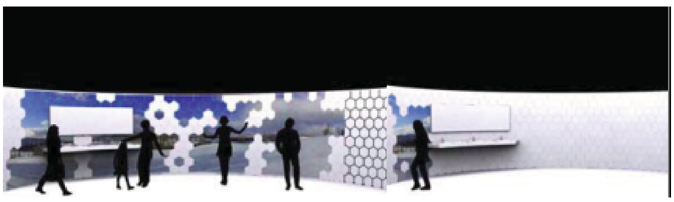
Figure 4. Concept – Permeable space.

Concept 2: Privacy gradient
The concept pin points the cause for the psychological discomfort and awkwardness of people in public loos as the infringement of their 'concept of privacy'. An indication of which is the avoidance of eye contact and conversation between strangers in loos.

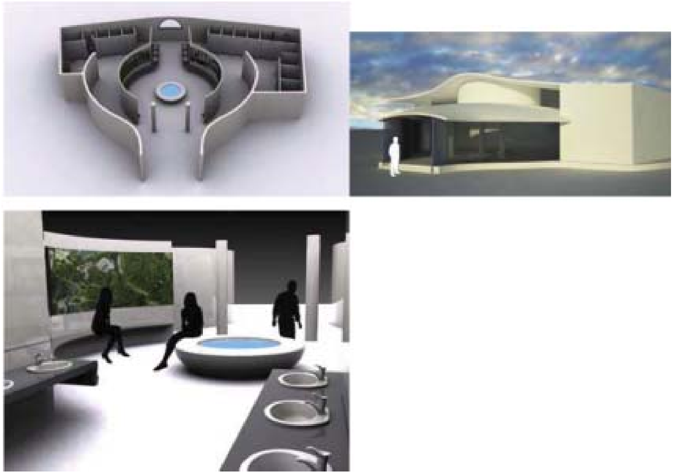
Figure 5. Concept – Privacy gradient.

The proposed loo creates a privacy gradient in the toilet space, such that the transition (human movement) from a public street to a private loo cubicle is gradual and not abrupt. This gradual change is brought about by social spaces (that encourage communication, shared experience) and visual transparency (relating transparent spaces as public and opaque spaces as being private) as buffering agents to achieve this interaction. The social space is a semi-private area that you enter first, where you can refer way-finding information, maps, read notices or just rest for a while. It follows from the pattern of the 'central courtyards' seen in multicultural community architecture. Apart from being a privacy buffer (like the drawing room in a home), it encourages a community feeling such that the occupants can feel more comfortable with others and themselves.

This central social hub (watch walkthrough moviehttp://www.youtube.com/watch?v=Vn3OxBCxyfQ) also provides shelter for waiting queues and demarcates a safe zone for the children while their parents are in the loo.

Conclusion

At a home a toilet is considered as a private area, and is often decked with personal articles and accessories, similarly a public loo can be philosophically considered as a private part of the city. The level of comfort that the people in a city feel in using a public loo has something to say about their community spirit. The concept of privacy depends on many factors including culture, sex, age and other contexts. In a situation where people are comfortable with their own 'dirt' yet are repelled by a public toilet because it is used by many others. The issue of perceived hygiene can be useful to study further to design better public loos.

Through the two example solutions it is hoped that more attention would be invested in the design of public loos in future. Making them more comfortable and novel so as to become an important 'shared' experience in a community.

Acknowledgements

Many thanks for the Efteling design team for their advice. Thanks to my tutors Marijke Melles and Mark van huystee. And the coordinators of the course exploring interactions – Pieter Desmet and Stella boess. I kindly acknowledge the participating schools, children, and parents and thank all colleagues for their support.

References

1. Feltham Frank et al (2007). Designing tangible artefacts for playful interactions and dialogues. DPPI 2007. ACM, New York, NY, pp 61-75

2. Costello, B. and Edmonds, E. (2007). A study in play, pleasure and interaction design. DPPI 2007. ACM, New York, NY, pp76-91.

3. De Jongh Hepworth, S. (2007). Magical experiences in interaction design. DPPI 2007. ACM, New York, NY, pp 108-118

4. Lenay, C. et al (2007). Designing the ground for pleasurable experience. DPPI 2007. ACM, New York, NY, pp 35-58.

5. Mathieu A. Gielen (2007). What's on a childs mind: Contextmapping research for designer's inspiration. Ludic Engagement Designs For All conference 2007.

6. E. B.-N. Sanders. (2000) Generative Tools for CoDesigning. Published in a book called Collaborative Design, Scrivener,Ball and Woodcock (Eds.) Springer-Verlag London Limited.

7. Wensveen Stephan et al (2004). Freedom of fun, freedom of interaction. Interactions 11(5). pp59-61.

8. Alexander, Christopher, Ishikawa, Sara and Silverstein, Murray (1977): A Pattern Language. Oxford University Press.

This paper is the design argument of a submission to the SIDeR '09 Conference. The full submission, including an elaborate explanation can be found on www.sider09.com

Feeling it: sketching haptic interfaces

Camille Moussette
Umeå Institute of Design
Umeå University, 90187, Umeå, Sweden
camille.moussette@dh.umu.se

Abstract

This article discusses some challenges of prototyping haptic (touch) interfaces early on in the design process. It also showcases examples of prototyping activities for haptic interfaces that have strong "sketching qualities".

Introduction

The benefits of prototyping activities are generally well accepted in the Design community [2][3]. Prototypes can be used to test and evaluate possible solutions (usability and requirement-oriented approaches), but they can also be seen as tools to stimulate reflections, objects to frame, refine, and discover possibilities [6].

Over the last decades designers have developed their skills, tools and methods to build prototypes. Numerous tools and systems are currently available to aid, support and ease the prototyping of graphical user interfaces GUI (paper prototyping, screen mock-up, Flash simulator, etc). Outside the realm of the visual and auditory domains, there is limited knowledge and literature how to go about prototyping for the other senses (touch, smell and taste). Recent advances in tools and applications [4][8] have made it more accessible to build tangible and interactive systems that interact with the physical world. Can these tools help prototype and sketch non-traditional interfaces quickly and efficiently?

Protyping haptic interfaces

The skin is a very complex, resilient and refined organ. It offers extreme sensitivity and tremendous capabilities as a medium between the external world (objects and environment) and us. The sense of touch is relatively well understood and documented medically, but designing directly for it (or around it) is very uncommon. Braille and other assistive devices for visually impaired persons have been developed for some time now, but they usually address very specific needs and situations.

Haptic interfaces are most commonly found today in game controllers (force feedback), training simulators and mobile devices (simple vibration). These systems tend to be either very complex and expensive (flight simulator) or extremely trivial (simple vibration). Can designers dive into the subject of haptic and fully explore its capabilities and limits throughout the design process? Is there room for rich, humane and natural-like sensorial experiences using the touch sense?

The sketching or prototyping of haptic interfaces brings interesting challenges for designers:
• How do you create touch stimuli with simple and cheap hardware?
• How do you communicate and document the perception of touch without building the whole system/apparatus? What kind of language or lexicon you need to use?
• How do you account for personal differences in the perception of touch?
• What is sufficiently good or acceptable for haptic feedback?
• What is "low-fi" for haptic interfaces?

These points demonstrate the great difficulties that one has to address in order to prototype haptic and generally other non-traditional interfaces.

Examples of haptic prototypes

The following examples showcase results of recent design activities related to the sketching of haptic interfaces. They were selected mostly for their "sketching qualities", meaning that they are manifestation of early ideas, were quickly put together and have to clear intention of producing "final quality" haptic feedback. They are haptic sketches with just enough information or function to inform the current questions at hand. They try to adhere to The Principles of Prototyping proposed by Lim, Stolterman and Tenenberg [6]:

Fundamental prototyping principle:
Prototyping is an activity with the purpose of creating a manifestation that, in its simplest form, filters the qualities in which designers are interested, without distorting the understanding of the whole.

Economic principle of prototyping:
The best prototype is one that, in the simplest and the most efficient way, makes the possibilities and limitations of a design idea visible and measurable.

The examples are briefly described but the accompanying video presents them in action or in use. The time factor (how long it took to build) is a major factor in prototyping activities. Even tough the domain of haptic interfaces in complex and demanding technically, we believe that quick and dirty prototyping activities are totally possible and very desirable when framed properly in the design process.

In: Wouters, I.H.C.; Tieben, R; Kimman, F.P.F.; Offermans, S.A.M. and Nagtzaam, H.A.H. (Eds.)
'Flirting with the Future', Proceedings of SIDeR '09, April 15-17 2009, Eindhoven University of Technology, the Netherlands.

A group exercise to brainstorm and prototype a haptic mp3 player (2 hours)

Figure 1. Manual testing and brainstorming of haptic features

The haptic “features” (various sequences or stroking gestures) were implemented using common-day items and the Wizard of Oz technique. One of the participants would actuate a miniature hammer (pipe cleaner and magnet) on the extension of the armband, creating tactile stimulation on the user’s arm. Other alternatives were explored using small cases fitted with “ribs” and small rocks, that would generate, when tilted steps and notches stimuli in the user’s hand. The quality of the haptic feedback was low, rough and not easily reproducible, but the prototypes and the process of building them led to unexpected explorations and discussions among the group’s members.

Haptic navigation grip (4 hours)

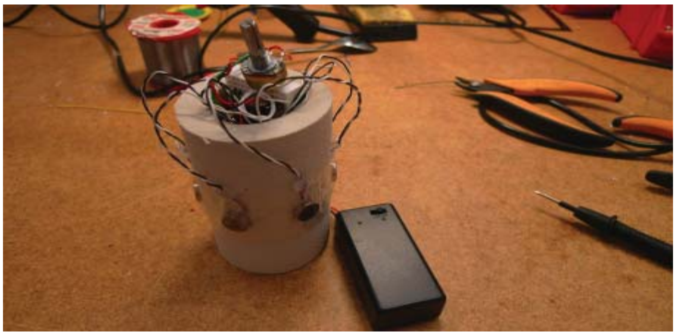

Figure 2. A grip with 7 vibrators, with manual control.

A prototype of a cylindrical grip fitted with seven vibrators around its perimeter. The knob at the top controls the direction of the stimulus. The manual operation (via the know) acts as replacement for an eventual electronic compass that triggers the right vibrator to maintain a specific heading. The prototype showed that the vibration propagates very easily throughout the grip. A decoupling (soft) material or suspension mechanism should be added to properly isolate the source of vibration from the main body of the grip.
Poking grip (1 day)

The prototype was build to test how it would feel if you one part of a handheld device would stick out and poke you palm. The interface was build quickly with servo motors cardboard and pins, controlled with an Arduino board (basic sequences only). The poking action was perceived adequately by users and the prototype was used a proof of concept to continue further the development of this genre of haptic interface.

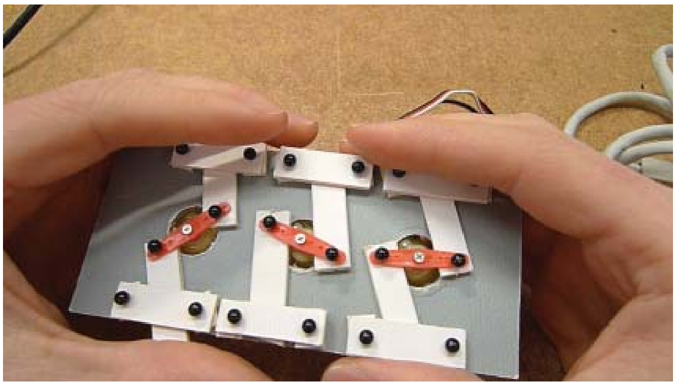

Figure 3. Servo motors to poke the user’s hands.

Penta-grip, manual control (3 days)

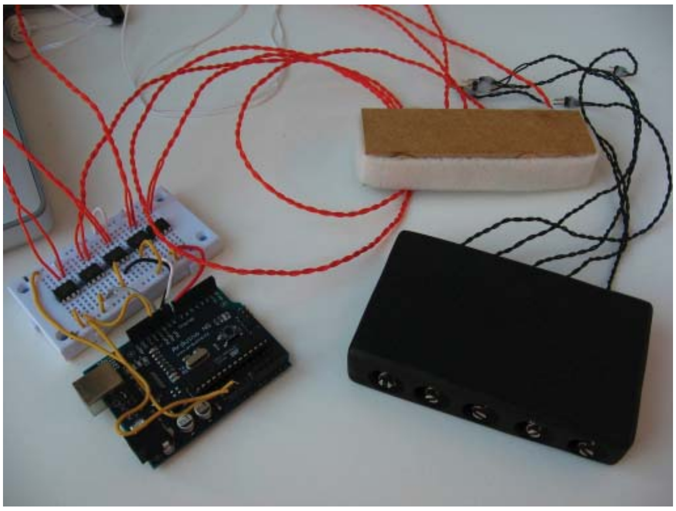

Figure 4. Poking grip actuated via embedded electronics, no computer needed.

A handheld interface using vibration as stimulus. Five nodes can be triggered via a matching controller. No computer or software was needed to activate this prototype. The natural interaction technique, like a puppeteer, allowed free exploration of interesting sequences by many users.
HAPI grip with software (1 week)

Figure 5. Full prototype with advanced features and controlled via software.

This prototype adds computer control capabilities to the penta-grip (described previously) and doubles the number of vibrator to allow left-right stimulation of the interface. The level of development is higher in this prototype but it proved necessary to obtain proper replicable sequences of vibration. The software controls offer recording and playback functions of the sequences. This implementation was useful to establish and determine valid timing values for sweeping and rolling stimulus [5][7].

Conclusion

Prototyping and sketching of non-traditional interfaces pose new challenges for designers[1]. Very few reference points (and guidelines) exist for exploring and working in these new areas like haptic interfaces. It demands a good reflection about the nature of prototyping itself: how simple or low fidelity is appropriate, desirable and/or justifiable while developing for new (uncommon) senses. The difficulties arise mostly from finding the right balance between complex technical development and sufficient outcomes/results to inform or ground design decisions[3][6].

We have presented various prototypes or sketches of haptic interfaces. They were selected to show that quick hardware sketching and prototyping activities are still possible and have their place, despite the unfamiliarity and complexity of projects involving the touch sense.

References

1.Brewster, S.A., McGookin, D.K. and Miller, C.A. Olfoto: Designing a smell-based interaction. In Proceedings of ACM CHI 2006 (Montreal, Canada), ACM Press Addison-Wesley, pp 653-662

2. Buchenau, M. and Suri, J. F. 2000. Experience prototyping. In Proceedings of the Conference on Designing interactive Systems: Processes, Practices, Methods, and Techniques (New York City, New York, United States, August 17 - 19, 2000). D. Boyarski and W. A. Kellogg, Eds. DIS ‘00. ACM Press, New York, NY, 424-433.

3.Buxton, B. 2007. Sketching User Experiences: Getting the Design Right and the Right Design,
Morgan Kaufmann, San Francisco, CA.

4.Colin Swindells, Evgeny Maksakov, Karon E. MacLean, “The Role of Prototyping Tools for Haptic Behavior Design,” haptics,pp.25, 2006 International Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems (HAPTICS’06), 2006 3.Holmquist, L. E. 2006. Sketching in hardware. interactions 13, 1 (Jan. 2006), 47-60.

5.Jyrinki, T. 2004 Perception of Small Device Vibration Characteristics - Test Facilities Setup and Study, Masters thesis. Helsinkink University of Technology. Finland.

6.Lim, Y.-K., Stolterman, E., and Tenenberg, J. 2008. The anatomy of prototypes: Prototypes as filters, prototypes as manifestations of design ideas. ACM Trans.

This paper is the design argument of a submission to the SIDeR ‘09 Conference. The full submission, including an elaborate explanation can be found on www.sider09.com

Google it!

Mikko Pitkänen
Umeå Institute of Design
Umeå University, SE-901 87, Umeå, Sweden
info@umu.se

Abstract
In this paper I describe the possibilities and impossibilities on finding and extracting information. I will also discuss the style of writing in subjective manner in comparison with academic dispassionate style of writing.

Author Keywords
Google, information retrieval, Wikipedia, academic writing, publications.

ACM Classification Keywords
H5.m. : Miscellaneous.

Introduction
In this paper I'm going to talk about the necessity of this paper and the difficulty of finding relevant information to back my conclusions. I will also touch on the delicate subject on finding information on the internet, which I find to be fast and effective way of finding reliable information and the paranoia that most scholars have on the reliability of that. Like for this paper I can find many academic white papers, but cannot access them. For example, this text, "Why is it difficult to find comprehensive information? Implications of information scatter for search and design: Research Articles", by S.K. Bhavnani ,it took me almost 30 minutes to find this through all sorts of portals. For this particular paper, I found the abstract on many journal portals, but none of them had the full text. Finally, I tried "googling" it, and found it immediately, by just using three keywords. Very discouraging. The whole system of writing should be reviewed by the scholars of the modern times.

Even the text that I finally recovered from the depths of the internet, did not contain information I required. The text was entitled "Why is it difficult to find comprehensive information? Implications of information scatter for search and design: Research Articles." The title is misleading however, what Bhavnani mostly discusses in this paper is how Bhavnani and Bhavnani et.al. in 2001, 2003 and 2005 researched people who were searching the internet or "googling" for information about melanoma.[1] However, I did find several blog entries describing this exact problem that I will discuss. Which I will not use, since it is considered to not to have the same value of importance as a paper reviewed by an academic. I will however implement to this paper what these articles said, but not quote them. Most of this paper will be based in my own subjective opinions, in a style not conforming to the academic format.

Finding wrong information and coping archaic systems
The main reason for writing this particular piece is that I could be talking about my project. About how predictive text recognition and sentence auto-completion would help people with cognitive disabilities to perhaps learn the language. But for this I can only find a single paper to prove it might work, and it's only theoretical and uses sources that are 15 years old, so technology in them is outdated. This I find one of the most dominant vulnerability of the academically proven text. When the technology and people's habits are developing so fast, the texts written about them, are seriously lagging behind. At least I am much more comfortable with reading hyper-linked documentations that give you instant feeling of craving for more information rather than old-fashioned method of browsing through the bibliography and then searching for books or text you cannot find. The internet was created as a research tool and that's what it's good for. Trusting old information is just as bad as trusting false information. If I would use something that was written 15 years ago, that would be something really out of date. How would that be any better than using a blog or a forum posting or any other kind of 'untrusted' source? Checking the sources and reviewing the data on these white papers, takes a lot of time and unless it is something truly revolutionary this data might get old even before it is published. For example searching the academic databases for "old information" you will find a paper entitled "Old and new information about electroshock", by a certain U. Cerletti and dated 1950. Now I can't read the paper for a reason which I don't understand, but even by looking at the title and the date, I just know that that information is very out-dated and irrelevant to anything. Shocking mental patients with electricity has been proven inefficient ages ago, so the whole paper just exists still, because someone wrote it and a bunch of academics read and reviewed it. Update: it is actually the most effective way to cure a patient with a severe depression, I found this information on Wikipedia, which led me to finding a paper about it.[2] That just proves that without checking your facts fast, you can not be trusted. And we all know that Wikipedia can't be trusted, because someone said that people can't be trusted. But, imagine a better, more understanding world, where the scientists check the information on Wikipedia and correct it. . The digital layout can be updated, and you don't even have to write another paper to do it, just edit the text and you are good to go. The digital format, that is to say, the internet, usually is not reviewed by an academic person, but everyone even a scientist can leave a comment on the internet, thus validating the information. Well, those things actually beginning to emerge from the ground. This is indeed good news. Now that the newspapers are predicted to even die, this style of writing is definitely losing popularity and new methods to publish are required. Even

In: Wouters, I.H.C.; Tieben, R; Kimman, F.P.F.; Offermans, S.A.M. and Nagtzaam, H.A.H. (Eds.)
'Flirting with the Future', Proceedings of SIDeR '09, April 15-17 2009, Eindhoven University of Technology, the Netherlands.

as I'm revising this text, MIT has announced that it will publish all it's papers free and open.

INTUITION AND WRITING AS A DESIGNER

Loanne Snavely, in her badly scanned paper discusses the value scientific writing and the peoples capabilities on reading information literacy.[3] This type of literacy can only be learned and the on-going paranoia about the reliability of web resources can be avoided by looking at the text and thinking whether it is reliable or not. Would you trust that quote or not? I can't find any citations to prove whether that statement is correct or not, but even a child (can't prove that either) can understand it to be true. Information literature, or as one of Snavely's suggestions for a new term for it is "Info'R'Ús", is intuitive much like writing an article without citations. [3] Design is a field that heavily uses intuition and does not rely on strict rules, although there are some that think design should have strict limitations. [4] Therefore should the designers writing to be constricted to a format, where the designer feels uncomfortable? The academic formats restrict the writer's freedom of expression a lot, the layout is predefined, although images can be added, they might not get published. Also having images extracted from the flow of the text and put in an appendix is hurting the appeal of reading and writing. Also writing these to a strange formats, made me notice that without Microsoft Word or some kind real layout program, you are hopelessly lost trying to fit the text into this format and several layout problems have occurred due to that, especially this Springer format that is using a template created specifically for Microsoft Word, this particular program is rarely if ever a part of a designers program-arsenal. If a designer needs to write a text he or she usually uses InDesign or Quark or any other layout program. Or as is the case many designers just open-source NeoOffice or OpenOffice, which are better suited for occasional writing than the costly Microsoft Office.

Then what is a good format for designers to write in? Well, I don't think that it is to be found in the academic world. As design already balances somewhere between science, engineering and art, the balance for writing can be found from those areas as well. Artists usually don't have to back up their work by research, so they only rely on the visual/experience/emotions. Engineers write papers, same with scientists. Now how to find a balance? Interaction designers need to build a use for something the engineers have built. Usually this is done with scenarios or stories to display how a product or a service is gradually changing over time. Many times it is agreed, that video is the best solution to portray this transformation. Scientists and engineers rely on statistics to show the progress of time, because academic rarely relies on the emotional aspects of a product or a service, this sort of numerical storytelling is alright, but for a designer something else is needed. Designers should be learning storytelling as a part of their curriculum. Starting form making small comic-book kind of short stories for a product use, then moving on to video as a sketching tool and finally using animation to polish the effect of the story.

PASSIONATE ABOUT WRITING

Forced referencing, silly quotes and finding statistics to prove your point are also key elements of academic text. This is doing for the sake of doing it. Statistics prove nothing. Most people equipped with intelligence know it, they might not have the statistics to prove it, but somewhere in their heart they just know it. And now to prove my point. As I am writing this paper, half of the class is doing the same thing. This shows the lack of interest in writing dispassionate academic, boring text. Human being is constructed in such a way, that being passionate and enthusiastic keeps the motivation level high.

If something is reduced to a mere task, it will lead to poor performance. This paper being written the way it is written, because I feel passionate about the subject. I can't write dispassionate text about something that I feel strongly about.

What if you do get passionate about academic text? No premature closures of debates, please: A response to Ahrens, by Kakkuri-Knuuttila et.al. (2008), is a response paper to someone who wrote a response paper to their previous paper. And at the time of the writing of this paper none of this has been published, or is it? This sort of writing in the future is something that I accidentally discovered, and found it very confusing. Did these papers go through a time portal?

Kakkuri-Knuuttila et.al. give a snappy response to Ahrens, because he didn't fully understand what their previous paper was about and made hasty assumptions. [5,6] This whole scientific cockfight is portraying the exact thing that could be avoided with the digital layout of information. Ahrens missed some key elements that Kakkuri-Knuuttila et.al. were trying to convey. Obviously accounting is something that has a questionable amount of interest to the normal person, but Kakkuri-Knuuttila et.al. seem to have a keen interest in making their point clear to everyone within the scientific community of their particular interest. Kakkuri-Knuuttila et.al. change their tone to an angry one, simply because someone didn't understand their point. This debate also gives hints to whether this kind of language used in making these papers conveys the essence of the point of the author or authors to their audience. Perhaps using somewhat more informal style of writing, the core of the text could have been understood in the first place, and there would have been no need to write another, just to correct someones misunderstanding.

CONCLUSION

As a designer, I feel that it is important not to use a predefined format of writing. Much information or sub-information will get lost, if the designer is not able to write in a style that suits him. White papers are good have their place in the scientific world as something that gives us new information about the world, but the disregard of subjective and unverified information, will cripple the possibilities of revealing some areas that have not been explored yet. The language used in academic papers will also hurt the information given. Using difficult structures in sentences and including unfamiliar words make the text unreadable for some. This way the academic society does not seemingly want to share their knowledge with the ordinary people. It is as though the papers have been written for a few their friends who can decipher the meaning, and even then, some of it gets lost in translation. The internet however gives the power to the people, the academics can discuss matters in their own small circle, but once and a while someone can extract the information from them and make it legible to everyone. All the information can be edited right there and on the spot, there is no need for corrective writing that has to go through various reviews, the people review the information, and edit it if necessary. This kind of interactive information sharing, should improve the academic as well the public persons knowledge base to a better and more understandable level, while providing easy access. In my experience, as a storyteller by motion graphic designer and now a storyteller by interaction designer it is my opinion that storytelling should be integrated into interaction design programmes. To envision a product or a service being used and then trying it out with people and then writing a paper about the experience makes the whole built up momentum that has gone in to the work flop. A recent conference I was in, featured some of these design-flops. A few very interesting projects were let down in the end by presenting an academic paper written about it. Not the experience or the service or the product, but the paper . This conference (TEI) is next year trying a new format, specifically made for designers, that do not rely on academic formats or references or anything else designers do not feel comfortable with. A lot of people in the conference opposed this change, but as a designer I actually feel less intimitated to submit something next year.

REFERENCES

1. Bhavnani S.K.Why is it difficult to find comprehensive information? Implications of information scatter for search and design: Research Articles. J. Am. Soc. Inf. Sci. Technol. 56, 9 (Jul. 2005), 989-1003. DOI= http://dx.doi.org/10.1002/asi.v56:9

2. W. Vaughn McCall, Joan Prudic, Mark Olfson and Harold Sackeim, Health-related quality of life following ECT in a large community sample, Journal of Affective DisordersVolume 90, Issues 2-3, , February 2006, Pages 269-274.(http://www.sciencedirect.com/science/article/B6T2X-4J2KT6B-2/2/4a00fd21cac4d5f6addec8edc4b202d7)

3. Snavely L. and Cooper N., The information literacy debate, The Journal of Academic LibrarianshipVolume 23, Issue 1, , January 1997, Pages 9-14.(http://www.sciencedirect.com/science/article/B6W50-45S90WH-18/2/96e7240feace3dfa1dc

4. Tschichold J., Die neue Typographie, Ein Handbuch für zeitgemäss Schaffende, Verlag des Bildungsverbandes der Deutschen Buchdrucker, Berlin, Germany, 1928..

5. Marja-Liisa Kakkuri-Knuuttila, Kari Lukka and Jaakko Kuorikoski, No premature closures of debates, please: A response to Ahrens, Accounting, Organizations and SocietyVolume 33, Issues 2-3, , February-April 2008, Pages 298-301.(http://www.sciencedirect.com/science/article/B6VCK-4-P0N8VY-1/2/cf0fd63d95dd296f1cabececb64fcfa4)

6. Thomas Ahrens, Overcoming the subjective-objective divide in interpretive management accounting research, Accounting, Organizations and SocietyVolume 33, Issues 2-3, , February-April 2008, Pages 292-297.(http://www.sciencedirect.com/science/article/B6VCK-4PK8FXT-1/2/0b63ba70d0d81c0386013b9b22763ad7)

This paper is the design argument of a submission to the SIDeR ‘09 Conference. The full submission, including an elaborate explanation can be found on www.sider09.com

Implication of haptic interface for complex interaction in specialized vehicles

Amid Moradganjeh
Umea Institute of Design, Sweden

Abstract
It is likely that the sense of touch will be playing an important role in the evolution of the art of computing [1]. To the date, haptic interface has been considered to have limited applications for complex environments. In this paper, I use the screen based interface of a harvester machine as an example of a complex specialized interaction and explore the implication of a haptic interface in that environment. I design and propose a haptic control system which delivers the same functions in the absence of visual information and without using input buttons. Also, I argue how this system solves some of the problems associated with sole visual interfaces and provides new beneficial characteristics to the interaction between man and the machine.

Introduction
The approaches in using the information technology in industrial machinery operations remains a design task of adding graphical displays and digital buttons to the existing mechanism. The limitations and disadvantages are revealed within complex interaction environments, where repetitive decision makings are based on the visually presented data and the inputs are still in the form of manual.

I use an example of a harvester machinery operation, where the whole process is being assisted with a computerized system and the operator is constantly monitoring, evaluating, confirming and changing the outputs shown on the screen by using the buttons on two separated joysticks.

To evaluate the possibilities of improving the interface, a series of qualitative research was done by interviewing expert users, observations, and also reviewing the related literature and the technical data related to the machine. The problems identified were categorized into two categories; issues related to the usability of the interface and the ones around the processing of the visual information by the operator.

In the following sections, after analyzing the identified problems, I develop the idea of having a special haptic interface that suits specialized machinery like the harvester. In the end, I argue the benefits of having this haptic control when it comes to learnability, flexibility, adaptation and some other related areas.

In order to validate the concept and to be able to conduct user tests, I made a prototype which includes the main functions of the proposed concept. I also use the observations results to validate the arguments I make on the characteristics of such haptic interface.

Problem identification – complex visual interfaces
In the early stages of research, it became clear that some of the problems are exacerbated with information technology. Because of the fact that the input interface is in the form of discrete buttons, it is less likely that the operator can form a useful mental model for the whole system.

On the other hand, processing relatively comprehensive graphical information on the screen in a very short period of time demands a heavy mental work from the operator. The heavy mental work demand is due to the fact that the operator is to make frequent decisions based on the observations from the changing surrounding as well as the visual data constantly presented on the screen. This leads to overloaded visual information channels and most of the mistakes made by operators occur when they are not able to handle the heavy load of visual input. By utilizing additional sensory channels of the user, such as haptic, it is possible to lower the amount of visual information and allow the visual attention to be concentrated on the details of the environment.

Figure 1. Operator in the cabin using the screen-based interface.

Feedback level
As the operation situations constantly change, the level of control, also the type and the amount of feedback an intermediate operator needs is different from an expert one. An expert operator is not only more skillful in using the interface, but also there is a parallel skill development for work strategies. In operating a specialized vehicle, these two expertise do not develop at the same rate and the users normally become more proficient in using the interface while they might be in the middle of learning curve of the operational skills. A complex interface like the one of the harvester machine does not meet the needs of both the

In: Wouters, I.H.C.; Tieben, R; Kimman, F.P.F.; Offermans, S.A.M. and Nagtzaam, H.A.H. (Eds.)
'Flirting with the Future', Proceedings of SIDeR '09, April 15-17 2009, Eindhoven University of Technology, the Netherlands.

intermediate and the expert user at the same time. Moreover, the control interface is passive and its response contains little information pertinent to the state of the environment.

In addition, the screen and button based interface influences the strategy of the operation. This inflexibility is partly the result of the computer and control buttons that have been added into an originally mechanically controlled interface and without addressing the nature of the operation and the environment in which the user is using it.

Haptic feedback

Within possible alternative forms of exposing the information to physically driven type of interfaces, I find haptic an important new opportunity. Haptic interface has shown to be advantageous as an interaction modality for specific tasks [2]. The results of utilizing haptic steering wheel have shown a significant reduction in visual demand [3].

With the computerization of interactions which historically we carried out manually, the future will be to bring back the original feelings associated with mechanical age presentation. Besides, the haptic modality is the only modality that can be employed as a simultaneous input and output channel, to allow a more exact modulation of input to be achieved [4]. Haptic feedback is also capable of providing the users with salient information when visual information channels are overloaded [5]. On the other hand, by combining haptic feedback and visualization, it is possible to increase the intuitive understanding of the operation [6] and reduce the energy in the action and response time [7].

One of the most important characteristics of haptic feedback is the possibility to have output in the form of input [8]. Considering the fact that the visual attention has originally been supposed to be used to acquire information from the surroundings, being exposed to a constantly changing screen can involve a big portion of the short term memory of the user with the visual feedback which is not necessarily useful.

Device architecture

The choice of mechanism for a haptic interface is influenced by both the nature of the application and the part of the body interfaced with. Considering the number of degrees of freedom of each hand, the challenge is to develop a control architecture which includes a range of input gestures and meets the perception requirements of human being. In complex machinery, the operation involves both the spatial control and digital-analog input of commands. The big number of actions, the range of combinations, sequences and time dependency of tasks in operating a specialized vehicle, makes it less practical to have an input-output control with the existing joysticks and necessitate a new configuration of a hand control device for the interface.

Concept structure

My solution to create a wider range of distinctive input gestures is to combine the two separated hand-controlled joysticks into one device with up to 24 degrees of freedom, allowing both translation and rotation in 3D for each component. This way the control device suits the control of the crane as well as accommodating a bigger number of actions. By using hand gestures instead of buttons, there is a more possibility to implement haptic feedback in the configuration.

The concept control device is based on a main part with 6 degrees of freedom. There are two arms connected to the main part which could be rotated in three different directions. Each arm is connected to a grip which has 3 degrees of freedom. All of these joints and arms can have force and position sensing feedback. Also, by adding passive touch cues which are presented to the observer's skin [9] the grip can be used for notification of events and to create relatively nonintrusive, ambient background awareness [10].

Figure 2. A basic model of the concept showing the main part, arms and grips.

As the number of degrees of freedom goes up, the number of possibilities explodes. However, this can result in a device that could be harder to build or be used. Further expanding the design space, each joint can be controlled to be passive or active at different stages of operation. [11]. For example a joint could be fixed during one part of the operation to make it possible for the mechanism to function in a specific direction assigned to that stage of the operation. The structure of this interface makes it possible to implement kinesthetic feedback to the most linkages as the main type of haptic feedback.

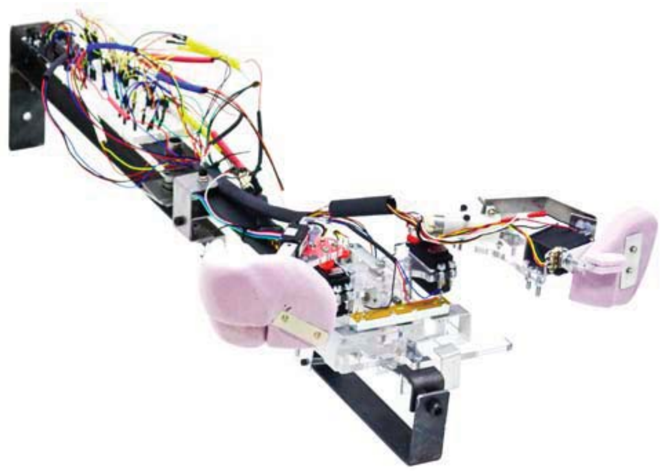

Figure 3. The prototype consists of more than 80 parts, 6 actuators and 8 sensors which are all being controlled by an Arduino microcontroller.

Movements and mental models

The way operators are interacting with this interface structure can be categorized into three different mental model groups: One is when both hands apply forces in line with each other, for example pushing both hands to move the arms in the same direction. This allows the operator to use either hand to accomplish the same task. This brings the freedom to select either of hands depending on how the user prefers to divide the tasks between them. For instant in the test prototype, it was seen that the users tend to control the cutting length by their right hand while the left hand is used for positioning the crane; they learn to automatically use their right hand for positioning the crane once they need to perceive a specific haptic feedback on the other hand.

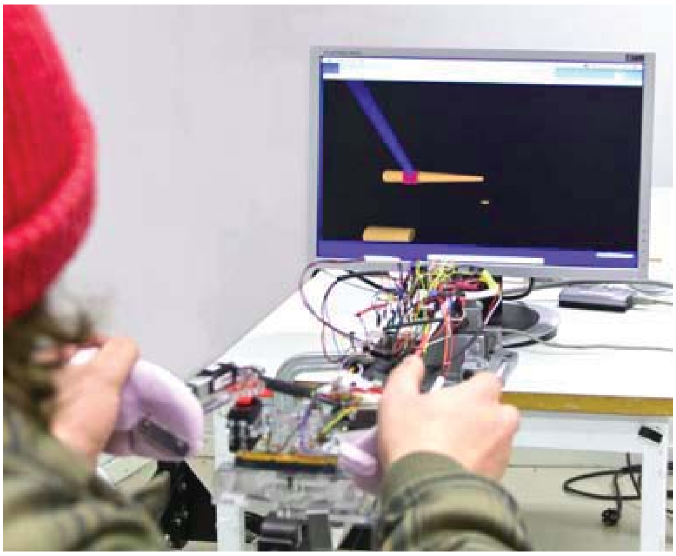

Figure 4. Simulation of the operation in Processing environment.

The other group are the type of hand movements that are supposed to apply opposite forces. This requires that both hands be involved at the same time. This is essential for the actions that need to be done as one task at the time and therefore it is essential that hands be involved together.

The other group of hand movements are the ones associated with a single arm and therefore are assigned to only the left or the right hand. This way, it is possible to have a specified number of parallel tasks. As an example from the prototype I made, while activating the automatic cut button, it is barely possible, to activate the quality change on the right arm of the control device.

In this haptic system, tasks can be assigned to the interface components depending on their relations, possibility of being parallel to each other, sequences, timelines, frequency of usage and the possibility of error occurrence.

From the cognitive point of view, a complex task involves a mixture of controlled and automatic processes. Automatic processes are not limited by working memory capacity and can coexist with other tasks as opposed to controlled processes which are slow, serial, effortful, and capacity limited. A skill component becomes automated when it's triggering conditions and associated actions can be compiled into procedural form in the long term memory [12]. Therefore, an initial design consideration for such haptic interfaces is to identify those components of the user's task which would benefit from becoming an automated cognitive process and those components that should remain controlled. Here, the architecture of the proposed interface makes is possible to assign the tasks accordingly and in order to make it more relevant to the mental process. In addition, harvester operators can benefit from continues input of haptic control as continuous tasks become more natural when controlled with continuous input [13].

It is obvious that mastering this haptic interface demands more training. However, since the system is going to be used for a long time, the ease of use after a specific time period is more important. In fact, I consider this as a benefit, as becoming skillful in using the interface will be happening at a speed closer to the operational skills development. Expert users constantly seek to learn more and to see more connections between their actions and the interface behavior. Their mastery of the product prevents them from becoming disturbed by the added complexity [14]. In the proposed flexible haptic interface, for example, it is possible for the expert users to develop new ways of manipulating the interface while the intermediate users are still able to perform the same task but in a different way suitable for their experience level.

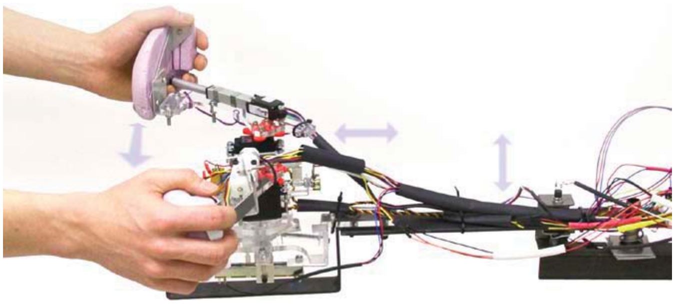

Figure 5: The haptic control being used by two hands.

Characteristics

Adaptation

One of the dilemmas of interaction and interface design is how to address the needs of both beginning users and expert users with a single, coherent interface [14]. While an intelligent interface can be a solution for some of the adaptation problems, the desired degree of adaptation remains a factor of the operator's need [12]. For this haptic control architecture the adaptation of the interface can be controlled directly by the operator. For example, as observed in the prototype test sessions, the participants learn to alter the orientation and adjust the compensating force on the left hand grip to control the amount of feedback they need to perceive for the next suggested cutting line. Users learn feedback compensation for the extrinsic dynamics and forces, with the potential for lower control effort [15]. As the level of operational skills increases, the role of feedback diminishes and there is a shift in attentional control from low level processes to more conceptual high level processes [16]. This means that too much of feedback for an expert user can have reverse effects on the performance. Depending on the experience of the user and also the task, I observed that users become aware that they are able to filter the type and control the amount of feedback they need to receive. At the beginner's level, the haptic feedback can also offer clues as to what an operator's options are, through constraints and gentle guidance.
Figure 6: The user trying to position the hand to feel the force feedback generated by the linear motor.

Flexibility

In the control of complex machines, the operation consists of a series of sequences of smaller tasks and their relations depend on the personal work strategy and the skills of the operator. For example in a semi-computerized process of cross cutting a tree, at the same time of felling a tree, operator is planning ahead the strategy of cross cutting the logs. In button based interface the operator can only activate the buttons at a certain time and order; this affects the flow of the operator's mental process, while in the proposed flexible haptic control, the operator is able to orient and position his hands at anytime when he makes a decision and is waiting to perform it. As an example, the operator needs to change the suggested quality type of the tree, should he encounter a curve in the tree. In this case the operator has to push the assigned buttons at a certain time simply to avoid the interference with the other action buttons and sometims because it is not ergonomically possible. In my observation of user tests on the prototype, I realized that the users are changing the quality of the tree as soon as they notice the need to do so by orienting the right hand at a different angle. Rotating the grip, in this case, is not going to affect the other parts of the operation. This results in a smooth flow of the process.

Replacing buttons with the hand gestures also give the flexibility of performing a combination of tasks at the same time. From the user tests, I observed that the methods used to accomplish the same goal change by practice, whereas in the button based joystick, the order of actions remain the same for the users at different proficiency levels and only the performance time decreases. As another benefit, using hand movements has a positive influence in regard to the Fitts' law.

Figure7. A scene of a prototype user test session.

Conclusion

Although the touch sense is generally used in conjunction with other sensory to have the best possible results [10], by using this prototype I show that the operation's goal can be accomplished without the existence of any visual clue and without using buttons as means of input.

Reconfigurability is an important advantage of the haptic interfaces as they can change their feedback in response to the environment they control [13]. I observed this to some degrees in using the prototype with the available functions.

Haptic feedback can reduce motor or visual strain when the manipulation is exacting or prolonged. It can also offer selective, suggestive guidance with a cue that the user can smoothly and variably over-ride [13]. For long term operations like harvesting, continuous control of haptic has benefits over discrete input of buttons.

Human adaptation to dynamic interaction forces and the ability to learn the control of extrinsic states has previously been shown in visuo-motor tasks. In a feedback task, the adaptation can be probed by altering the dynamics of the object or the sensory information regarding the object's motion [15]. Muscle memory is a great source of manual skill and the frequent and patterned nature of the tasks of this haptic architecture helps to structure stylized gestures, reducing cognitive load and long extra steps.

References

[1] Ralph Hollis, Haptics,Berkshire Encyclopedia of Human-Computer Interaction, W. Bainbridge, Ed., Berkshire Publishing Group, 2004, pp. 311-316.

[2] S. Wall and W. Harwin. Quantification of the effects of hapticfeedback during a motor skills task in a simulated environment.In Proc. Second PHANToM Users Research Symposium, 2000.

[3] Micah Steele and R. Brent Gillespie, 2004 ,SHARED CONTROL BETWEEN HUMAN AND MACHINE: USING A HAPTIC STEERING WHEEL TO AID IN LAND VEHICLE GUIDANCE, 12th Symposium on Haptic Interfaces for Virtual Environments and Teleoperator Systems, pp. 358-366.

[4] Michelitsch, G., Ruf, A., van Veen, H.A.H.C., van Erp J.B.F. Multi-finger Interaction within the MIAMM project. EuroHaptics 2002 conference. Edinburgh, July 8-10, 2002.

[5] Hendrix CM & Durfee WK; Human Motor Performance while using a Single DOF Visual-Haptic Interface; Proc. 11th Int. Symp. on Haptic Interfaces for Virtual Environments; pp. 70-76; 2003 ; Los Angeles, California, USA.

[6]. J. Dean Brederson, Milan Ikits, Christopher Johnson, and Charles Hansen, 2000, The Visual HapticWorkbench PHANToM Users Group Workshop, Aspen, CO, 46-49 p.

[7]. (Alec Bernstein, Bernd Bader, Klaus Bengler and Hermann Künzner, Visual-haptic interfaces in car design at BMW-BOOK HUMAN HAPTIC PERCEPTION, GRUNWALD M (ED.) BIRKHÄUSER, chapter 36.

[8]. PhilipKortum,2008, HCI BeyondtheGUI, DesignforHaptic, Speech, Olfactory, and OtherNontraditional Interfaces, , Denise E. M. Penrose , 136 p.

[9]. Gallace, A., Tan, H. Z., and Spence, C., 2007 "The Body Surface as a Communication System: The State of the Art after 50 Years," Presence: Teleoperators & Virtual Environments

[10]. MacLean, K.E.; Hayward, V., 2008, Do It Yourself Haptics: Part II [Tutorial], Robotics & Automation Magazine, IEEE Volume 15, Issue 1, March 2008 Page(s):104 – 119.

[11] F. Barbagli and J. K. Salisbury, ''The effect of sensor/actuator asymmetries in haptic interfaces,'' in Proc. 11th Symp. Haptic Interfaces for Virtual Environment and Teleoperator Systems, 2003, pp. 140–147.

[12] Margaret M. Gardiner, Bruce Christie, Applying cognitive psychology to user-interface design,1987, John Wiley & Sons, Inc. New York, NY, USA, 182p.

[13] Karon E. MacLean, 1999, Application-Centered Haptic Interface Design, Chapter for publication in Human and Machine Haptics, M. Srinivasan and M. Cutkosky, Eds., MIT Press, 1999. In edit. Section 3.9.

[14] Alan Cooper,Robert Reimann,and Dave Cronin, About Face

3 ,The Essentials of Interaction Design, Wiley Publishing,Inc. 2007, 41 - 47p.

[15] Felix C. Huang, R. Brent Gillespie, and Arthur D. Kuo, 2005,Human adaptation to dynamic interaction forces during learning of a visuo-motor task, Transactions on Robotics, Vol. 21, No. 5, October 2005, pp. 1009-1016.

[16] Margaret M. Gardiner, Bruce Christie, Applying cognitive psychology to user-interface design,1987, John Wiley & Sons, Inc. New York, NY, USA, 179p.

This paper is the design argument of a submission to the SIDeR '09 Conference. The full submission, including an elaborate explanation can be found on www.sider09.com

Qiki keeps you going, gently

Wouter Widdershoven
Eindhoven University of Technology, Department of Industrial Design, Eindhoven, the Netherlands
w.p.a.widdershoven@student.tue.nl

Abstract
This paper describes the idea behind Qiki as well as the design process and the final concept. Qiki is a product designed to help people with Alzheimer's disease structure their life and stay active. It is developed in close collaboration with patients, caregivers, and Alzheimer experts. First evaluation results are promising.

Introduction
It is commonly known that in Western societies the older population is growing. The demographic change, due to the proportional rise in the ageing population, will have an impact on our health care sector. In the Netherlands, for example, the prevalence of dementia in 2050 is approximated to be 400.000 [1]. The increasing population of older people in need of care will encounter a shortage of (young) care providers. Therefore, we need technology to improve care of older patients. Most technological development (domotica) focuses on surveillance. This increases supervision on people, and consequently does not make them more self-sufficient. Qiki aims to directly support people with Alzheimer's disease, from the beginning stages to the later stages. In this paper the design process is described, and first evaluation results are presented. Finally a plan for future implementation and evaluation is sketched.

Design Process

Steps in the design process
Qiki was developed during a bachelor graduation project. It was designed in an iterative way, together with stakeholders (people with dementia, family members, and professional caregivers). First, the problems in dementia were investigated through literature research, observations and interviews with stakeholders. It turned out that dementia leads to inactivity and problems in structuring daily activities [2]. Early in dementia, people get easily confused. Later, they lose interest and are only activated through tactile contact. This led to the initial concept of a device which should address people (to make them more active), help them to structure the day, and invite tactile interaction. The device should also be attractive and user friendly. Through a series of prototypes, Qiki gradually got its present form.

Characteristics of Qiki
Qiki has three main characteristics: first, it approaches the user in a positive manner; second, it fits the needs of the user in various stages of the disease; and finally, all stimuli coming from Qiki are familiar to the user.

Figure 1. A group of Qiki's. Different fabrics for different people.

In the early stage of Alzheimer's disease, people easily get confused, understanding the day rhythm can be difficult them. Qiki helps the user in a positive manner by pointing out and inviting to participate in common activities throughout the day. For instance, Qiki may wish the user good morning, and tell her she will be picked up for daycare soon. Later in the day she may remind the user that it is time for a cup of coffee.

In a later stage, tactile contact becomes more important. Qiki's tactile stimuli are recognizable and positive. If Qiki is caressed it purrs like a cat; when tickled, Qiki laughs. If Qiki is dropped accidently, it says 'ouch' and will be unresponsive (als hij huilt: 'will cry') for two seconds (erg kort?). Qiki may also propose joint activities, like singing songs.

Qiki is programmed before use. Through a computer, Qiki is equipped with a voice, recorded from a friend or relative. The familiarity of the recorded voice is important to increase cultural connection and recognition. Also the week scheme is installed. The exterior can be adapted; the cover can vary from soft silk to warm wool.

Qiki is neither a toy, nor a pillow. She has an abstract shape with a recognizable character. The drop-like shape is inviting without being childish. The cover, like the voice and day scheme, is adaptable. On the outside there are no buttons, screens, led lights, or wires that indicate it is a technological product. The textures of the different fabrics allow for recognition.

In: Wouters, I.H.C.; Tieben, R; Kimman, F.P.F.; Offermans, S.A.M. and Nagtzaam, H.A.H. (Eds.)
'Flirting with the Future', Proceedings of SIDeR '09, April 15-17 2009, Eindhoven University of Technology, the Netherlands.

First evaluation

Method

As part of the bachelor project, Qiki was evaluated in a nursing home. People living in the home were invited to try Qiki during the regular group meeting at the daycare center. The technology inside the Qiki prototype still needed to be connected to a computer in order to work. To avoid Qiki coming across as a high-tech device, a long cable, hidden in fabric, was used to connect to a remote laptop. The interactions with the Qiki prototype were videotaped. Afterwards, the footage was discussed in a focus group of four psychologists with expertise in Alzheimer's disease.

Results

During the test period, Qiki was very well received. The patients liked its look and feel, and actively responded to it. One of the patients even refused to give it back to the researcher, and was reproached for that by one of the other residents. During the focus group the participants agreed that the users were intrigued by Qiki. While they explored the interaction possibilities of the prototype, the users did not look scared. Additionally they remarked that the people, who did not interact with Qiki directly, also got involved, although in a less active way. Thus, the effects were not only on the individual user, but also on a group level.

Figure 1. Stills of the film of the first pilot tests. Patients interacting with a Qiki prototype.

Discussion and Conclusion

The first results of testing Qiki in practice are promising. The device is user-friendly, and stimulates people with dementia to become more active. The basic idea behind Qiki appears to work. During the first test, an unexpected result was the impact on the group processes at the daycare center. Qiki is thus empowering patients not only in an individual way, but also in a social way.

Given the positive results, Qiki will be developed further and tested in a more structured way. The design is developed further by Widid and Unit040. The device will be tested in a nursing home, using both effect research and process research.

Qiki is an example of an innovation which can fit to future society. The technology in Qiki is smart and simple, and also user friendly. Qiki does not contain technological gadgets; it fits to the everyday life of its users. It does not aim to control the user, but to help him or her to structure his or her life, and to form new relations with others. In Qiki, technology does not take the form of big brother, but of little sister, paying attention to people in a playful way, inviting them to join in and helping them to give meaning to their life.

Acknowledgment

We gratefully thank the patients and caregivers at the day care center, and Alzheimer Centrum Limburg for their continuous support and expertise.

References

[1] Gezondheidsraad. Dementie. Den Haag: Gezondheidsraad, 2002; publicatie nr 2002/04. ISBN-10: 90-5549-417-8

[2] WG Rosen, RC Mohs and KL Davis . A new rating scale for Alzheimer's disease. Am J Psychiatry 1984; 141:1356-1364

[3] Kreueger R. A. and Casey M. A. Focus Groups: A practical guide for applied research. Sage Publications, Inc. 2000. ISBN: 0761920706

This paper is the design argument of a submission to the SIDeR '09 Conference. The full submission, including an elaborate explanation can be found on www.sider09.com