DHRS

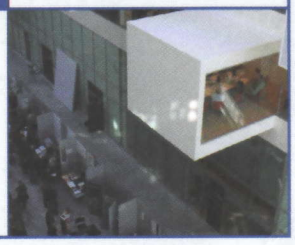
November 2007

Proceedings of the

Seventh Danish HCI Research Symposium

Anker Helms Jørgensen & Morten Borup Harning

Samfundslitteratur



Kompendium produceret for IT-Universitetet

DHRS 2007

Proceedings of the

Seventh Danish HCI Research Symposium

IT University of Copenhagen

November 22, 2007

Anker Helms Jørgensen and Morten Borup Harning

IT University of Copenhagen

Nov. 2007

DHRS 2007

Proceedings of the Seventh Danish HCI Research Symposium

IT University of Copenhagen

November 22, 2007

Edited by
Anker Helms Jørgensen
IT University of Copenhagen
Morten Borup Harning
SIGCHI.dk

IT University of Copenhagen
Nov. 2007

Preface

The current proceedings document the thriving Danish HCI Community. Since 2001, the dark and wet November has been enriched by DHRS: The Danish HCI Research Symposium where a considerable part of the Danish HCI research community gathers in a friendly, informative and supportive one-day symposium.

The Aarhus people took the lead in 2001, followed by University of Copenhagen (2002), Roskilde University Centre (2003), Aalborg University (2004), Copenhagen Business School (2005), and Aarhus once again (2006). In 2007 the IT University of Copenhagen is proud, pleased and grateful to host DHRS in the spectacular building designed by Henning Larsen.

The proceedings include 21 papers, each 2 pages: enough to get a message through and yet very accessible. Eight of the papers were presented orally at the symposium, while the remaining 13 were presented as posters. The papers document the diversity in the Danish HCI research community.

The symposium included a keynote by an internationally reckognized figure in HCI: professor Jonas Löwgren from Malmö University who talked about *An Interaction Designer's Sense of Quality* – a topic highly relevant to researchers and practitioners alike.

The DHRS 2007 is organized by the IT University of Copenhagen in collaboration with SIGCHI.dk.

Copenhagen Nov. 12, 2007

Anker Helms Jørgensen

Morten Borup Harning

Keynote

An interaction designer's sense of quality

Professor Jonas Löwgren, Malmö University, Sweden.

Abstract

The two backbones of proficient design are the abilities to Create and to Assess. To Create is to generate ideas; to Assess is to judge the merits of those ideas.

The default assessment approach within HCI is, as always, empirical testing. However, I would argue that significant assessment is going on long before anything testable appears in the design process.

One of the things that differentiate more experienced designers from less experienced ones is their ability to assess ideas based on a sense of how they would work out in the hands of users.

I suggest that this sense of interaction-design quality can be untangled into concepts describing desirable properties of interactive products and services in different genres. Such properties are called experiential qualities.

In the presentation, I will introduce two such qualities: Pliability and fluency. Pliability refers to the user's sense of shaping a malleable material, and it is relevant in the design of interactive visualizations. Fluency concerns the gracefulness with which the user can manage multiple demands on attention and action in a mobile setting.

Much like a critic in, e.g., architecture, I aim at constructing the experiential quality concepts by combining examples and reasoning. The intention is that they should help other designers develop their assessment ability.

Table of Contents

Final Programme for the 7th Danish HCI research Symposium 2007

10.00 Paper Session I

10.00 Morten Hertzum and Maren Fich Granlien, Roskilde University
Perception and Adoption of an Electronic Medication Record Three Years after Deployment

10.20 Johan Trettvik and Rune Nørager, Aarhus University
Email attachments – from a psychological perspective

10.40 Georg Strøm, Copenhagen University
Power Distance and User-centered Design in a Traditional Culture

11.00 Break

11.20 Paper Session II

11.20 Ole Gregersen and Linda Passarge, KMD A/S
Logbook Thinksheets: A tool for preparation, self-observation and ongoing relationships in analysis for GUI design

11.40 Ellen Christiansen and Anne Marie Kanstrup, Aalborg University
A mobile design lab for user-driven innnovation – history and concept

12.00 Poster Session A
See the list of posters on the next page

13.00 Lunch

14.00 Keynote
Professor Jonas Löwgren, Malmö University
An interaction designer's sense of quality

15.00 Break

15.20 Paper Session III

15.20 Ather Nawaz, KTH, Sweden and Torkil Clemmensen, CBS
Cultural differences in the structure of categories among users of clipart in Denmark and China

15.40 Rikke Ørngreen, CBS, Janni Nielsen, CBS and Karin Levinsen, DPU
Client Centred Design: Grounding design decisions through a strategic focus

16.00 Olav W. Bertelsen and Marianne Graves Petersen, Aarhus University
Erotic Life – an issue in HCI?

16.20 Poster Session B
See the list of posters on the next page

17.20 Networking

18.00 Dinner

20.00 After dinner session

22.00 End of DHRS

Final Programme for the 7th Danish HCI research Symposium 2007

Poster Session A 12.00 – 13.00

Sune Alstrup Johansen, IT University of Copenhagen
Can eye tracking bring new life to retrospective think-aloud?

Anker Helms Jørgensen, IT University of Copenhagen
A User Interface Issue in 1956: Preserve the Keystrokes in Usable Form

Gabriela Mancero and William Wong, Middlesex University, UK
Perceptual Depth to Enhance Change Detection

Niels Mathiasen, Aarhus University
Usable Security Revisited

Lene Nielsen, CBS
Personas - communication or process?

Rune Nørager and Johan Trettvik, Aarhus University
There is no "where" only "what" in user interfaces: lack of spatio-temporal dynamics undermines user interaction

Qingxin Shi and Torkil Clemmensen, CBS
Communication pattern and usability problem finding in cross-cultural thinking aloud usability testing

Poster Session B 16.20 – 17.20

Kasper Løvborg Jensen, Aalborg University
Evaluating Mobile, Ubiquitous and Context Sensitive Services in the Field

Anker Helms Jørgensen, IT University of Copenhagen
Mainstream versus Mainstream: Two aproaches to User Interface History

Rasmus Berlin and Clemens Nylandsted Klokmose, Aarhus University
Undo in dynamic and distributed user interfaces

Lill Kristiansen, NTNU, Norway
Telephones, CSCW and HCI: "smart phones" but a "black box" telephony system?

Lene Nielsen, CBS and Sten Filskov Jensen, Snitker & Co.
Challenging the borders between East and West

Jannick Kirk Sørensen, University of Southern Denmark
Typology of Personalisation- & Customisation Services

Perception and Adoption of an Electronic Medication Record Three Years after Deployment

Morten Hertzum
Computer Science, Roskilde University
Bldg 42.2, Universitetsvej 1, Roskilde, Denmark
mhz@ruc.dk

Maren Fich Granlien
Computer Science, Roskilde University
Bldg 42.2, Universitetsvej 1, Roskilde, Denmark
maren@ruc.dk

ABSTRACT
Region Zealand's electronic medication record is generally perceived by hospital staff as useful but not that easy to use. Neither perceived usefulness nor perceived ease of use is more than weakly correlated with actual adoption. The complex work domain with interdependent staff groups and many interrelated systems may be part of the explanation for the weak correlation.

INTRODUCTION
As part of the extensive efforts to substitute electronic patient records for paper records at Danish hospitals, an electronic medication record (EMR) system has been deployed at the hospitals in Region Zealand (one of five healthcare regions in Denmark). The system has been in operation for two to four years at the region's hospitals, and work procedures involving the system have thus had time to stabilize.

According to technology-acceptance research [1, 3] people's adoption of a system depends to a considerable extent on their perception of its usefulness and ease of use, even when adoption is mandated. Several work procedures involving the EMR system are mandated in the region's standard operating procedures for medication. This study aims to investigate (a) how the EMR system is perceived by the hospital staff after they have gained considerable experience with it and (b) how aspects of perceived usefulness and perceived ease of use correlate with adoption in a complex work domain.

THE ELECTRONIC MEDICATION RECORD
The EMR system is intended to help ensure that the right medication is given to the right patients at the right time. The system is used by both physicians and nurses for maintaining an overview of patients' medication and specifically by physicians for ordering medication and by nurses for dispensing and administrating medication. Patients' diagnoses, lab tests, treatments, and other non-medication information are not documented in the EMR system but in other electronic and paper records.

SURVEY METHODOLOGY
This study consists of an online survey. An email requesting participation was sent to all function managers, department managers, ward managers, and EMR coordinators at the hospitals in Region Zealand, a total of 430 people. Participation in the survey was anonymous and after issuing two reminders we received 232 responses, for a response rate of 54%.

The survey contained questions about the extent to which different parts of the system were used and the extent to which different work procedures involving the system were followed. The response categories for these questions were *Always*, *Very often*, *Often*, *Rarely*, *Very Rarely*, *Never*, and *Don't know*. Participants were also asked to indicate their agreement to a number of statements about the usefulness and ease of use of the system. The response categories for these questions were *Agree completely*, *Agree somewhat*, *Either*, *Disagree somewhat*, and *Disagree completely*. Apart from these fixed-response questions participants were asked to describe barriers to using the system and following work procedures. In total the survey comprised 59 questions.

RESULTS AND DISCUSSION
Regarding perceived usefulness Table 1 shows that 64-73% of respondents agree (completely or somewhat) that the EMR system provides a good overview of the different parts of the medication process. The three remaining items about perceived usefulness concern the quality of the medication process and yield slightly less positive results. The median response for the item concerning whether the right medication is ordered is neutral, that is neither agreement nor disagreement. Several respondents comment that the EMR system has not reduced the number of medication errors but merely changed the types of medication error.

Regarding perceived ease of use the results are more mixed. Medication ordering, which is the physicians' responsibility, is perceived as simple by only 37% of respondents and as too time consuming by 61% of respondents. Conversely, dispensing and administration of medication, which is the nurses' responsibility, is perceived as simple by 51% of respondents and as too time consuming by 39-40% of respondents. By comparing the ratings given by nurses (N = 129) and physicians (N = 94) we find that for two of the items about perceived usefulness and four of the items about perceived ease of use nurses and physicians assess the EMR system differently (Mann-Whitney tests, all ps < 0.05).

Six of the 12 items in Table 1 correlate significantly with the extent to which system facilities are used and five items correlate significantly with the extent to which work procedures are followed. The correlations are however weak, suggesting either that adoption of the system does not yield sufficient benefit to produce consistently positive

Item	Positive	Neutral	Negative	Correlation with system use	Correlation with work procedures
Perceived usefulness					
Good overview of medication orders	73%	19%	8%	0.16 * [a]	0.11 [d]
Good overview of dispensed medicine	64%	26%	9%	0.35 *** [b]	0.31 *** [e]
Good overview of administered medicine	69%	26%	6%	0.30 *** [c]	0.25 *** [f]
The right medication is ordered	47%	35%	18%	0.13 [a]	0.14 * [d]
The ordered medication is administered	69%	22%	9%	0.11 [b]	0.13 [e]
Medication is administered at the right time	56%	30%	14%	0.08 [c]	0.12 [f]
Perceived ease of use					
Ordering medication is simple	37%	34%	29%	0.06 [a]	0.12 [d]
Dispensing medication is simple	51%	35%	14%	0.40 *** [b]	0.36 *** [e]
Administering medication is simple	51%	33%	16%	0.39 *** [c]	0.37 *** [f]
Ordering medication is too time consuming	61%	29%	9%	0.21 ** [a]	0.10 [d]
Dispensing medication is too time consuming	39%	39%	22%	-0.05 [b]	0.01 [e]
Administering medication is too time consuming	40%	39%	21%	0.00 [c]	-0.01 [f]

Table 1. Perception of the EMR system and the work processes in which it is used, *N* = 232.

Notes: 'Positive' gives the sum of responses in the categories *Agree completely* and *Agree somewhat.* 'Neutral' gives the responses in the category *Either*. 'Negative' gives the sum of responses in the categories *Disagree completely* and *Disagree somewhat*. 'Correlation with system use' gives Spearman correlations with: [a] Question: extent to which the tab sheet *Medication orders* is used. [b] Question: extent to which the tab sheet *Dispensing/administration* is used when medication is dispensed. [c] Question: extent to which the tab sheet *Dispensing/administration* is used when medication is administered. 'Correlation with work procedures' gives Spearman correlations with: [d] Question: extent to which standard medication orders are used. [e] Question: extent to which the dispensing of each medication is signed for separately. [f] Question: extent to which the medication is signed for when it is administered to the patient. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

assessments or that assessments are not sufficiently positive to foster consistent adoption. The weak correlations are somewhat contrary to the technology-acceptance model [1, 3], specifically for perceived usefulness. One explanation for the weak correlations might be that the EMR system has multiple groups of user, such as physicians and nurses. While the groups are highly interdependent in their actual use of the EMR system, they may tend to perceive its usefulness and ease of use mainly from a within-group perspective. Another explanation might be that the EMR system is only one of several interrelated records. For years hospitals have been and will continue to be in a transitional state where some records have become electronic and others have not. The consequence of this transitional state is a disintegration of information, as stated by one respondent:

Nothing has been achieved, except that data are now recorded in [the EMR system]. Medication is no longer in the patient record; that is the unified overview of medication and symptoms is lost, which is a clinical disaster.

This quote captures an adoption barrier that is easily dismissed as merely transitional, but such transitional states have become an almost permanent characteristic of work in many complex domains. As a consequence, not only the usefulness but also the alignment and organizational implementation of systems are key concerns in achieving acceptance and consistent adoption of systems [2].

ACKNOWLEDGEMENTS

We thank Jette Gudmundsen and Mikkel Lundstrøm, who were instrumental in the design and administration of the survey. Special thanks are due to the survey respondents.

REFERENCES

1. Davis, F.D. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly* 13, 3 (1989), 319-340.
2. Markus, M.L. Technochange management: Using IT to drive organizational change. *Journal of Information Technology* 19, 1 (2004), 4-20.
3. Venkatesh, V., Morris, M.G., Davis, G.B., and Davis, F.D. User acceptance of information technology: Toward a unified view. *MIS Quarterly* 27, 3 (2003), 425-478.

Email attachments – from a psychological perspective

Johan Trettvik
MTI research unit
Department of Psychology
University of Aarhus, Denmark
+45 8942 4936
johan@psy.au.dk

Rune Nørager
MTI research unit
Department of Psychology
University of Aarhus, Denmark
+45 4041 4422
runen@psy.au.dk

Abstract

Forgetting to attach a file to an email before sending it into the cyberspace is a common experience for most frequent email-users. Here, we analyse this as a problem occurring for diverse of psychological reasons. There is an almost identical realization of two different goals; some of the steps in creating an email disturbs the ongoing activity, thus making habituated actions more likely; and there is poor informational basis for extracting information about the ongoing activity.

Keywords

Email, information, user interaction, cognitive functions, psychology

INTRODUCTION

Every day, emails are sent that should have had a file attached but where the sender forgot to attach it. Needless to say, this is both frustrating and potentially embarrassing, apart from the time wasted on a global scale requesting absent attachment and resending e-mails with the intended attachment. The full extent of the problem is not documented but a qualitative survey indicates that it is both pervasive and extensive. So far the solution to this problem has been sought inside a system-task framework. Such solutions span from either sound advices (like 'always to attach first' or 'don't write recipient address until last' etc.) or compensatory system add-ons that scan for the word attach (-ment) in the text and reminds you by pop-up box if there is no attachments present when you send. These solutions can be categorized in two domains that; 1) instigates *procedures* on the user side that seeks to minimize the risk of the problem occurring, and 2) *patches* the problem and instigates counter measures into the software functionality. These are all viable solutions, but the issue in a larger scope beyond a narrow system-task understanding is *why* does the problem exist in the first place, and why does it persist? Based on an analysis of the problem we identify a number of key characteristics general to software applications that, properly addressed, could yield more intuitive and functional future software applications.

DECOMPOSITION OF THE EMAIL PROBLEM

Why is it so hard for us to remember to attach a file while we write an email, sometimes even when we describe the content of the file we moments later forget? We suggest here that there are a couple of good reasons for us to do these kinds of errors, and that they represent an inherent conflict between the construction of email-programmes and the way we orient ourselves to the world. The problem is prototypic and fundamental not only to e-mail applications but software tools in general.

ANALYSIS

Let's first see what is required when we want to send an attachment. First we need to open/activate the email programme, write the recipient(s) address, write a title, write the text, attach the file, and finally, send the email. The entry and the exit (open and send) are fixed operations, but the rest are interchangeable operations, although a lot of people get into the habit of doing one thing before the other. Figure 1 shows a popular email programme, and the flow from writing an address to sending the file, in the case of attaching a file.

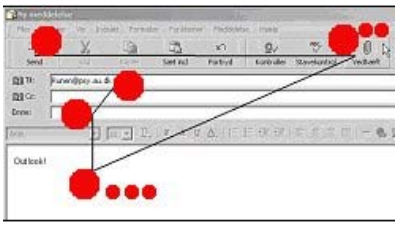


Figure 1: Outlook and Gmail. Most email programmes do not differ significantly from this pattern.

Figure 2 represents the difference between the user who can have two distinct goals and the email-programme that presents the user with only one kind of option. Distinguishing between action and operation [1], we see that the goal "send an email" is only different from the goal "send an attachment" in one small detail, i.e. the actual attachment of the file, which on the system-side is operationalised only by pushing one additional button, "attach a file".

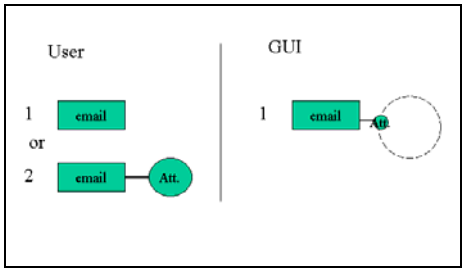


Figure 2:

The user is then required to consciously maintain which of the two goal is "active" and to search out attachment side if needed. Most of us have probably tried to change workplace and then one day, when our mind is busy with other things suddenly find that we are halfway towards the old place. When we do not consciously control our behaviour, automaticity kicks in [2]. This happens in emails as well. When we write our email, we get occupied by this activity and forget what we were about to do, and when done with writing, the automatic procedure from the most common activity, "send an email", takes us to the send button, even though we should have attached a file. Either we need to make the operational realization of the action sufficiently different to provide the user with the necessary information as to how to proceed, or we need to make the two action-goals sufficiently different so we provide the system an opportunity to understand our intention.

Now let us view this from a slightly different perspective. What if one person was to give a colleague an important piece of paper while they were talking together? Various scenarios might play out here, but the important part is that at some point the paper could be made physically present between them. It might be placed on a table or in one of the participants' hands. In this way, the paper is now part of the memory system to remember it (see [4] for more on external memory systems). Its not fool proof, to be sure, but it provides more information about the ongoing activity, than a little button tucked away in a corner. This also points towards an important fact about our activity. It is very seldom compartmentalized the way modern day computers and the programmes seems to imply. The differences between a multitasking computer and a multitasking human is a paper worth in itself but we will not treat it any further here, only advance to the point that there is a need for the computer (or some other tool) to be more integrative, when it comes to the ongoing activity.
So here we have the crux' of this particular problem, at least from a psychological perspective:

1. The two goals, "send an email" and "send an email plus attachment" might be distinct in the users mind but not in the operational realization of the software interface.
2. Writing an email requires much conscious effort (like most writing does) and might lead to automatic operations that lead to what is habituated.
3. There is a lack of distinct information that could specify the operation of attaching a file. In most email programmes it looks like any other button.
4. An email programme is usually treated as a stand-alone product. We have never seen any of our colleagues using the drag-and-drop option or the right-click on file option (applicable for thunderbird at least). For some reason the email programme gets all the focus, and all realization of any email-related goal is done through the interface provided by the programme.
5. The email programmes are all poor as external memory systems as they do not provide sufficient information nor do they "remind" the user of ongoing activity by having visible in the interface what it is he was doing.

GENERAL INPUT TO SOFTWARE

Based in the above analysis of the email attachment problem we can now formulate some very general perspectives:

Software must be embodied, goals and operations are not the same, different goals should be realized by sufficiently different operations, software used together should act together, and software should make memory-needed information visible.

REFERENCES

1. Bærentsen, K. B. & Trettvik, J. (2002): An Activity Theory Approach to Affordance. In: Bertelsen, O. W., S. Bødker & K. Kuuti (eds.): *Nordichi 2002. Proceedings of the Second Nordic Conference on Human-Computer Interaction*. October 19-23, 2002, Aarhus, Denmark. ACM-SIGCHI, Aarhus. P. 51 - 60

2. Bernstein, N.A. (1996): On Dexterity and Its Development. In: M.L. Latash & M.T. Turvey (Eds.): Dexterity and Its Development. N.J. Mahwah: Erlbaum.

3. O'Reagan, J. K. (1992): Solving the "Real" Mysteries of Visual Perception: The World as an Outside Memory. *Canadian Journal of Psychology*, v. 46 (3), pp. 461-488

Power Distance and User-Centred Design in a Traditional Culture

Georg Strom

Department of Computing Science, University of Copenhagen
Universitetsparken 1
DK-2100 Copenhagen O., Denmark
+45 40 18 12 72
georg@diku.dk

ABSTRACT

This study describes the challenges faced by designers and users of software in a developing country with a traditional culture, and it shows how economic and cultural differences may affect the design and use of software in unexpected manners. It is based on obsevations and interviews with twenty employees in three different administrations and on interviews or conversations with nine other informants.

Categories and Subject Descriptors

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms

Design, Human Factors

Keywords

Culture, intemational design, Hofstede, user-centred design

1. INTRODUCTION

Hofstede [1] and World values survey [2] have described cultural differences between different countries in general. In addition there are a number of studies of how cultural differences affect the perception or use of software interfaces. However, there is a lack of studies that describe the problems faced by designers and users of software in developing countries with traditional cultures, and how the designers and users cope with the problems.

The present study is based on a previous comparative study of cultural values in Denmark and Philippines [3]. The comparison is interesting because the differences between the two countries span a large part of the possible global variation. See table 1. The previous study identified a number of aspects that might be relevant when designing software for a country with a traditional culture, but did not verify them. The purpose of the present study was therefore to determine their consequences in actual work situations.

2. METHOD

The field part of the study took place from July 3 to August 4, 2006 in the same area as the previous study [3]. The main part was designed as semi-structured interviews, where the participants told about their daily work and about the problems experienced by them when using computers.

Table 1: Differences between Denmark and Philippines [3]

Philippines	Denmark
Low income (1,080 USD GNI/capita)	High income (33,750 USD GNI/capita)
Traditional	Secular-rational (post-modern)
Masculine – survival values	Feminine – well-being values
Large power distance – inequality and privileges are considered normal.	Small power distance – equality is seen as ideal.
Collectivistic	Individualistic

The participants in the main part of the study worked in a city administration and in two municipal (rural) administrations. I conducted interviews in nine different offices, where I interviewed in total twenty persons including department managers and employees. Most of them had a sufficient command of English for me to conduct the interviews directly. In addition, I was accompanied by my local assistant who occasionally interpreted my questions and translated answers that the respondents found difficult to express in English.

In addition to the main part of the study, I made notes from conversations or interviews with nine other persons. One of them had worked as a manager in the Philippine government's department for Science and Technology, and another had, until he retired, been in charge of courses and training for city and municipal officials in the area.

3. Results

I did interviews in offices of property assessment, where they provide the assessments that property taxes are based on, engineering offices and general administrative offices. My general impression is that the goals of the work are similar to those in Denmark and probably in other municipal administrations all over the world.

Despite the large power distance, I was told that a fast and good service to ordinary citizens was important. As an example, the main reason for introducing computers for word processing in an administrative office was to make it possible to write a permit or a so-called clearance at once, so the applicant did not have to come back later to pick up the permit.

In total I was told about 48 separate problems during the interviews.

The large power distance meant that the designers of new systems in some cases did not know the actual conditions of use. As an example, the system for entering government statistics required Internet access, even though none of two rural administrations had a fixed phone line that could be used for Internet access. An employee in one of the administrations told me that she had to go to an Internet cafe in the city to enter the statistical data, whereas an employee in the other administration told me that she had a friend in a government agency in the city, who allowed her to go there and use one of their computers.

My previous study [3] showed that computer science students always would choose the cheapest or least complicated solutions. The present study shows the same tendency in administrative applications. The assessment offices had on average only one computer for every eight office workers, and they optimized the use of computers by doing as much work as possible on paper forms before so-called encoders or computer operators entered the information into the computer.

As another example, all departments kept paper copies of the entered information, so it was possible to enter it again, if the electronic copy was lost, instead of relying on electronic backups. Given the limited experience with computers this made sense. Paper copies and paper archives is a well-known technology, and it is always possible to reconstruct the electronic data from it.

I found in my previous study [3] that there could be problems because technicians in Philippines would choose the cheapest or least complicated solutions, even though the same level of reliability was required as in Denmark. That was confirmed by the present study, where I observed and heard about frequent problems with unreliable equipment. I observed that many Filipinos are used to repair technical equipment, and it appears that this is a cultural prerequisite when computers and other electronic equipment are used in a dusty and often humid climate.

I found in my previous study [3] that Filipinos compared to Danes were more honest and expected more honesty on a personal level. Together with the tendency to choose the cheapest and least complicated solutions this meant that many companies tried to save money by using spreadsheets instead of investing in proper bookkeeping applications (presumably without knowing how to lock parts of the spreadsheets). The consequence was that any of the employees who had access to the computer could change both figures and formulas in a company's bookkeeping, and one of the informants told me about an embezzlement that had been done in that manner in a private company while she worked there.

I suggested in the previous study [3] that it might be worthwhile to take organisational dishonesty – for instance corruption - into account when designing systems [3]. The former manager in the department for Science and Technology confirmed this. He had thought about how difficult it is to find incriminating paper-based information, whereas it is possible to design electronic information systems such that all information can be accessed by auditors, and such that a single person cannot delete or change incriminating information.

I found in the previous study [3] that privacy was much less important in Philippines compared to Denmark. Even though the present study confirms the general tendency, I found exceptions that require an evaluation of each specific case. In Denmark assessments of property values are publicly available because they often are used as basis for prices when selling property. In contrast, the assessments in Philippines are used only for tax purposes, so only the tax authorities and the owner of the land has access to them.

Despite the collective culture and general sharing of information several offices had wanted to implement personal passwords. The reason individual passwords were not used was, that the encoders had not been able to get them to work properly with the available software.

I have seen the curricula of several Philippine colleges, and none of them teaches anything about usability, user-centred design or support of computer systems. That may be because such topics where it is necessary to reflect upon a personal practice are more accepted in a secular-rational (post-modern) culture than in a modern or traditional culture.

I was told about five problems that could be attributed to users not having learned to use the software. In addition, it is likely that lack of training contributed to some of the seven cases of accidental corruption or deletion of data I was told about.

In a similar manner, 23 of the problems I was told about could directly be attributed to the software not being adapted to the specific tasks. These problems were all in assessment offices that used database software that was designed specifically for them, and where the problems could have been avoided by applying some fairly basic user-centred design. In particular when the encoders clearly could explain both the problems and possible solutions to me.

4. DISCUSSION AND CONCLUSION

People in Philippines are in general open, and the semi-open interviews made it possible to get a rich information that made it possible to evaluate the answers. In addition, it appeared that the participants were eager to talk and explain, in particular about problems they had experienced when working with computers. In addition, the information from the interviews, from the previous study and from other sources to a large extent confirm each other.

The study indicates that lack of cultural adaptations or limited economic resources are not the causes of most problems when introducing computers in a traditional society. More problems are caused by lack of local awareness and knowledge about what in the Western world is considered good practice as regards user-centred design and courses and training for users.

5. Acknowledgements

Thanks to Arlene Y. Cinco, Philippines, for her assistance and to all the participants for their time and willingness to share their experiences.

6. REFERENCES

[1] Hofstede, G. *Culture's consequences.* Sage Publications, USA, 2001

[2] Inglehart, R. *Modernization and Postmodernization – Cultural, economic and political change in 43 societies.* Princeton University Press, USA 1997

[3] Strom, G: Interaction design for countries with a traditional culture: A comparative study of income levels and cultural values. In *People and Computers IX – The Bigger Picture* ed. by Tom McEwan, David Benyon & Jan Gulliksen. Springer, UK, 200

Logbook Thinksheets: A tool for preparation, self-observation and ongoing relationships in analysis for GUI design

Ole Gregersen
KMD A/S
Lautrupparken 42
2750 Ballerup
+45 4460 6376
ogr@kmd.dk

Linda Passarge
KMD A/S
Lautrupparken 42
2750 Ballerup
+45 4460 4073
lpa@kmd.dk

ABSTRACT
This paper describes 'Thinksheets', a method of keeping workshop participants motivated between sessions, including self-observation as a basis for reporting and preparation for workshop activities. An open and simple form keeps participants focused on overall interaction subjects rather than specific GUI solutions and allows individual reporting styles.

Keywords
Workshop, interface design, requirement inquiry, logbook, UCD, usability, prototyping, ongoing relationships, GUI design, observation.

INTRODUCTION
The project described in this paper is part of the process of specifying GUI requirements for a new IT-solution for the social services of the Danish public sector, under present development at KMD A/S[1] (as of October 2007). One of many challenges was that one user groups of the future solution, case workers at Danish municipalities, come from different areas of the social services. These areas have many similarities, but also great many differences. From workshops with 7 participants from this user group, a general set of GUI standards are derived, as part of creating standards for a general solution for all the social services, supported by a future IT-solution from KMD A/S.

The invited user group participants are all to be regarded as subject matter experts and daily users of their respective social service IT-systems. From KMD A/S a project team was established, including one Information Architect, a usability consultant and a project manager. The focus of this team was to perform a standard analysis of the user goals, tasks, needs and attitudes and to document these, creating a basis for future GUI prototype work. This was done through 4 workshops over a period of 4 months (over the summer of 2007), which left long periods of inactive time between workshops.

PROJECT SCOPE
Experience from earlier workshops showed that participants often need long introduction and warm-up within every workshop, since they tend to forget details and experiences within the time since the last workshop. Building on earlier experiences and discussions can prove challenging if details of these experiences are not maintained.

An early decision was made to introduce tools to maintain attention on the process and goal of the project among the participating users. This type of method has been described in the form of ongoing relationships, using more or less structured reporting tools like diaries or questionnaires [1].

The main tool was the "Logbook", named after logbooks known from sailing, diving and similar types of activities. The logbook itself is, in this case, a standard A4-sized folder, given to the participants on the first workshop. Initially the logbook contains a predefined structure of agreements, photos and descriptions of participants, agendas, summaries and sheet paper for notes. The logbook was formally introduced as a place to gather all documentation and information for the whole workshop process.

The aim of the logbook and its content was to activate and motivate participants to think in subjects relevant for GUI design and functionality, not only at the workshops, but especially while not actively engaged in these.

Further, we wanted to introduce a type of self-observation and reporting at the workplace, in the actual work context, by asking participants to focus on certain predefined HCI relevant subjects in the context of work.

[1] KMD A/S is the largest Danish-owned full service IT-provider in Denmark.

We found it important that participants could define their own understanding of GUI aspects and terms regarding these subjects, in order for them to use their own words to explain needs and attitudes towards a renewed IT-solution, not having their opinion shaped by existing technology or internal project choices.

The Thinksheet

An important part of the logbook was the Thinksheet, a single sheet of paper sent to the participants between workshops. It contained a short introduction to a specific subject or concept of which the project team wanted the participants to focus, followed by two areas in which coloured post-it notes with print were placed. On these notes a short assignment was printed, consisting of a general subject and one or more elaborations, e.g. "Automation: Calculations or assessments you perform, which you believe the IT-system could perform" (translated from Danish). The participants were asked to place the coloured notes on their computer screen and think about the subjects on the note, e.g. in coffee breaks, when waiting or at other possible moments during office hours.

Most of these subjects were described as short headlines rather than as questions in order to support a more free line of thought instead of direct answers. The post-it notes were chosen to create a non-intrusive and less formal format, firstly to allow the participants to add short notices in an ad-hoc style, secondly to put less work-like pressure on participants outside the agreed workshop setting, making it feel more like play than homework.

The Thinksheets were deliberately made as analogue and physical artefacts.

Before each workshop the participants would receive a new Thinksheet. The 4 subject groups of these were:

- Advantages and disadvantages of current IT systems
- Work or task interruptions and simultaneous tasks
- Automation of manual tasks and work support tools
- IT affect on work quality and learning new IT-systems

EXPERIENCES

A valuable experience was how the Thinksheets prepared the participants for the workshop activities, bridging the gap between their specialised work context and the overall project context of translating this actual work context into GUI requirement specifications. Even if participants did not actively apply data to the Thinksheets, simply introducing the subjects seemed to better prepare them for the activities at the workshops. Other experiences were:

- The more engaged the participants are in a common understanding of the projects scope, the more willing they are to perform project tasks outside the designated workshops.
- The participants apply more information if asked specifically, but the quality of the answers is higher when questions are formulated as broader concepts or subjects. Form has a strong influence in how much information the participants supply, using alternative reporting style offered additional possibilities of adding information to the project.
- Whether or not participants chose to report information between workshops, they seemed motivated and prepared during workshops because of the introduction to the subject given through the Thinksheet tasks.
- Self-observation of workplace and routines can be done with only little explanation and with simple tools, quickly allowing participants to become engaged in the assignment. Participants added new aspects to the observations when getting more familiar with its purpose and use.
- The method of using post-it notes on participant screens helped creating an atmosphere of being part of a special project at the workplace, which in terms created a relevant dialog with co-workers about the project and its content, applying even more knowledge to the project.
- Some participants react positively to alternative formats like photos, screenshots and Thinksheets and keeping the form open, added individual perspective and creativity in answers.

Finally the logbook method created the optimal basis for workshop activities. The participants were prepared for relevant subjects and the workshop activities would then relate these to actual GUI design challenges, introducing different technical solutions to the situations described by the participants. In that sense the participants became part of the work of translating their work context observations into design evaluations usable for requirement specification decisions.

NEXT STEP

Next round of workshops will include higher emphasis on alternative digital reporting methods like mobile phone photos, digital images and other tools available to most case workers, experimenting with form to allow creative reporting styles chosen by participants.

The project group also needs further studies to decide how to implement other tools and methods to support the general logbook, creating a stronger tie between the logbook and workshop process.

Finally Thinksheets must be developed to support later phases of GUI design and prototyping.

REFERENCES

1. Kuniavsky, M. Observing the user experience. *(Morgan Kaufmann 2003), page 376*

A mobile design lab for user-driven innovation – history and concept

Ellen Christiansen
Department of Communications
Aalborg University
Kroghstraede 1, 9220 Aalborg East
+45 9635 7353
ech@hum.aau.dk

Anne Marie Kanstrup
Department of Communications
Aalborg University
Kroghstraede 1, 9220 Aalborg East
+45 9635 9077
kanstrup@hum.aau.dk

ABSTRACT
The paper presents the history and conceptual foundation for the Mobile Design Lab[1], meant to support both designers and users in the acts of user-driven innovation. The Mobile Design Lab is based on Vygotsky's theory of tool- and language-mediation, and was created in 2004 to support research and teaching of user driven innovation. Being itself an example of user-driven innovation it has taken shape of HCI design research projects, in which we have been involved since 2004. The first challenge was to get 'out of the lab', the next to get 'out of the head', and finally we are currently working to get 'into the street'. To support these moves might seem simple, but it is in practice not at all easy. As for today the Mobile Design Lab comprises tools and techniques for categorization, articulation and concretization in design projects involving lead users as well as ordinary users, and invisible users.

Keywords
User-driven innovation, design of human-computer interaction, tools and techniques, categorization, articulation, concretization

INTRODUCTION
Design happens on the borders between what is and what humans imagine to be. Design is a constant moving back and forth in the zone between our space of experience and our horizon of expectation, physically, mentally and emotionally, and that goes for professional designers and everyday intuitive designers alike. When user-driven innovation is employed as part of a professional design process, more spaces of experience and more horizons of expectation as well as different language- and tool-traditions meet. In her reflections on "Design Research in 2006", Sanders describes designers' interest in involving users as a result of failed innovation in the years between 1999-2001: "innovation that was not relevant, not people-centred and ultimately not useful, e.g., the many failed products and services of the dot-com era" (Sanders 2004). Consequently, a search has been set out for "truly people-centered innovation" (ibid.). The Mobile Design Lab has been developed with the perspective to facilitate research in user driven IT-innovation in relation to design of human-computer interaction in the activity theory tradition, where development is seen as learning by expansion, and expansion is seen as a consequence of tool- and language mediation (Vygotsky 1978). The Mobile Design Lab began as a way to mediate design activity on users' turf, out in the field, facilitating physical and mental mobility, as in the FEEDBACK project, where we brought design artifacts into the homes of electricity consumers and tried to make the families reflect on their information needs (Kanstrup & Christiansen 2006). In the MINI-project we started to focus more on conceptualization. The design problem was initially formulated as something to which a PDA seemed to be a solution: e-support for junior registrar doctors in clinical training. In using prototypes and workshop artifacts from the Mobile Design Lab to support the physicians' conceptualization of their needs for support, we realized that the mobility of concepts was more important to their learning than the actual walking back and forth at the ward (Bertelsen, Kanstrup & Christiansen 2007). In the MAXI-project (www.maxi-projektet.dk) information concepts to support everyday living with diabetes are to be developed focusing on out of the house activities, the mediating role of the Mobile Design Lab is expanded to cover also concretization of needs, through situated role play in a constructed 'living lab'. Summing up, the history of the lab is a development through a series of research projects, where the term 'mobile' initially focused very concretely on geting 'out of the lab' and later more symbolically in relation to geting 'out of the head' and understanding real needs related to mobility. Today we have a more conceptual focus on getting 'out on the streets' and support users mobility in the world. In this paper we explain how and why we have developed the tools, techniques and materials of the Mobile Design Lab after a brief introduction to the conceptual framework for the lab and our work with user-driven it-innovation.

[1] The Mobile Design Lab is part of the research unit 'E-learning Lab Center for User Driven Innovation, Learning and Design', www.ell.hum.aau.dk , at the Department of Communication at Aalborg University.

A DESIGN SPACE FOR USER DRIVEN INNOVATION

Central to our work with user-driven IT-innovation is the separation of user-expressions and designer-foci: For users, a given technology is a mean to an end, while the same technology to the designers is *the* end. Perspectives, languages and responsibilities of users and designers differ. To negotiate solutions, needs and problems, boundary objects are needed. This is common knowledge among those practicing participatory design. In developing the Mobile Design Lab we conceptualize such common ground as a 'user driven innovation design space', which we see as the zone between user expression and designer-focus. The role of the Mobile Design Lab is to help

- designers move towards insight in the practice of users while bracketing their long-term goal: the solution
- users move towards innovation supported by tools, techniques and situation, while bracketing their long-term goal: an improved practice

We model the 'user driven innovation space' as in figure 1:

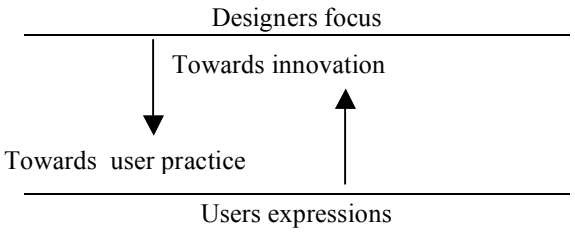


Figure 1: 'User-driven innovation space'

WHAT AND HOW

User-driven Innovation as we practice it consists roughly speaking in three activities: 1. evaluating known solutions, 2. expressing user needs, 3. formulating the design problem. The Mobile Design Lab supports all three by providing tools and techniques for *categorization*, *articulation*, and *concretization*, aspects, which we in our design practice find crucial to developing a common ground between designers and users in instances of user-driven innovation. Where and when to conduct these activities depends on actual circumstances.

The Mobile Design Lab supports *Categorization* by offering Polaroid cameras, which we invite users to use to shoot photos of significant items, and later we may ask them to annotate and sort their pictures in session, where they are evaluating solutions they already know. The Mobile Design Lab also holds a machine for lamination, so that designers can develop cards for users to sort. The Lab also holds a mobile wall, and a shopping cart as physical vehicles for posting and sorting experiences and ideas. Finally the Lab has a video-recorder, and we record most often sessions for memory and analysis of underlying discourses, and for teach back sessions.

Articulation of needs is supported by the Mobile Design Lab's growing collection of games and prototypes and prototype-materials, which we use in critical workshops and experiments, where the artifacts provoke reaction and explanations. As with the categorization activity the articulations are videotaped and analyzed in order to uncover preferences, values and habits.

Concretization of practice is where we by staging role play on location try to mediate user experience without invading user privacy, and create a safe and familiar, yet open and inviting, setting for users to reveal their preferred practice, not necessarily in words, but through action.

CONCLUSION

In this short paper we have briefly described the ongoing development of a mobile design lab to support instances of user-driven innovation. The space does not leave room for neither presentation of the actual research projects, which have led to this development, nor of the theory on which we build, or of the teaching program in which our Mobile Design Lab play an important role. What we have done here, however, is to present briefly vital components of the conceptual framework of the lab: that we understand user-driven it-innovation as a space within the two poles of users' and designers' space of experience and horizons of expectation, a space, which comprises solution, needs and formulation of design problems; and that we have developed tools and techniques to mediate the establishing of a common ground between designers and users by way of support for categorization, articulation and concretization.

Acknowledgements

We can not present the Mobile Design Lab in its present state without crediting the Obel Foundation for providing the initial funding, and expressing our gratitude to students and partners of the research projects which have prompted its development.

REFERENCES

1. Bertelsen, P., A.M. Kanstrup & E. Christiansen (2007) Problem based learning in Medicine in: Proceedings of ICEL, New York, June 28-29 , 2007
2. A. M. Kanstrup & E. Christiansen (2006). Selecting and engaging innovators: combining democracy and creativity, to be presented at Nordichi 2006 'Changing roles', Oslo, Norway, October 14-18, 2006, http://nordichi.net.dynamicweb.dk/
3. E.B-N. Sanders (2006) Design research in 2006 in: *Design Research Quarterly*, vol.1,no.1, 2006
4. Vygotsky, L. (1978) Mind in Society, Harvard University Press

Cultural differences in the structure of categories among users of clipart in Denmark and China

Ather Nawaz
Dept. of Computer and Systems Sciences (DSV)
Royal Institute of Technology (KTH)
Forum 100,SE-164 40 Kista
Stockholm, Sweden
ather@kth.se

Torkil Clemmensen
Department of Informatics
Copenhagen Business School (CBS)
Howitzvej 60, DK-2000 Frederiksberg
Copenhagen, Denmark
tc.inf@cbs.dk

ABSTRACT
There is a difference in how Danish and Chinese people group object, method and concepts into categories. Difference in these points has effects on information structure in applications which involves menus, links and directories. This study involve groups from Chinese and Danish cultures and investigates how these two cultures group cards with clipart pictures into different categories and how their cultural background affect the structure of their categories.

Keywords
Card Sort, Information Structure, Cultural Difference, Usability

INTRODUCTION
In this global world different applications must be equally usable across different countries. Cultural factors significantly affect information structure of applications worldwide because these applications are more used outside the countries and cultures where they have been developed and designed [1].Therefore their formation is primarily based on metaphors of the specific country or culture where this application is made and it ignore the fact of cultural based beliefs. Culture also has affect on the results of established methods of usability testing [2]. International usability testing of localized applications may have to be done by using local evaluators [3].

Difference in grouping has an effect on usability of software's. As Nisbett stated in his study, there are dramatic differences in the nature of Asian and European thought process [4]. Designing software for a global audience will increase global acceptance of software. Del Galdo and Nielsen spoke about cultural reflection in the software by stating that truly intuitive cross-cultural software should reflect the cultural orientation of its users and accommodate user's cultural differences [5].

GOAL
To investigate how different cultural groups differ from or are similar to each other when they group objects, functions and concepts into categories during a task. To investigate systematic differences in the structure of categories applied by users of clipart in China and Denmark.

BACKGROUND
Asians and Western cultures organize and group objects with different approaches. Western people tend to group objects into categories on the base of attributes where as Asians people tend to group objects on the base of their relationship. Studies of Ji, Zhanda and Nisbett (2002) showed the same kind of result where Americans participants make grouping on the base of common attributes whereas Chinese participant make grouping on the base of relation of objects with each other [6].

The primary goal of information systems should be to provide uncomplicated information structure to the users by keeping their cultural background in mind. Designers should localize applications in such a way which not only include language transformation but also keep the cultural and intellectual level of the people for which it is going to be made.

RESEARCH METHODOLOGY
In order to understand the difference in grouping of objects in both cultures, a card sorting experiment is performed. Card sorting is a usability method used in software and product design to discover the user's mental model of information structures [7].Card sorting is a useful way of finding the commonality and difference in grouping and categorization of respondents and experts of systems [8]. In this research, repeated single criterion sort is used as sorting technique to gather data from subjects of both cultures. This technique is used because it is more flexible and easier for most elicitors to handle, as users sorts the same entities repeatedly, categorizing in term of a different single criteria each time [8]. Card sorting experiments are performed in Denmark and China.

RESULTS
The participants in this study are one group of Chinese and one group of Danish users. Each group of Chinese and Danish consists of 10 participants; these participants are entitled as 'subjects' in these experiments. Wedding pictures for designing wedding invitation cards are used as Cards for this study. This study comprises of 10 sessions from ten subjects in each culture.

Results of Chinese and Danish subjects showed that Chinese subjects have more variation in their sorts as compare to Danish subjects. In *Sort 1*, Chinese and Danish

subjects were asked to make their own categories related to wedding criteria and they were asked to place cards into these categories. The result specified that there was more use of *other* category in the Chinese group as compare to the Danish group.

In *Sort 2*, Chinese and Danish subjects were provided predefined categories. Two thematically based categories, *two people together* and *Love*, related to wedding criteria were provided to subjects. The result showed that there was greater use of thematically based categories in Chinese subjects as compared to Danish subjects. On average Chinese subjects put 3.8 cards out of 20 cards into these two thematically based categories. Danish subjects put 1.9 cards out of 20 cards into these thematically based categories. Out of 10 Danish subjects, 6 subjects choose one card and one subject chooses no card for one of these thematically based categories. On contrary 6 Chinese subjects choose four or more than four cards for thematically based categories and only two Chinese subjects choose one card for one of these two thematically based categories

In *Sort 3*, Chinese and Danish subject were asked to place cards into categories related to wedding color. Chinese subjects identified red color more than Danish subjects. On contrary, Danish subjects identified white and off white color more as compare to Chinese subjects.

CONCLUSION

These results suggest that physical attribute of items and concepts should be dominant in Danish information and data manipulation of applications. On contrary, the structure of information in Chinese applications should be organized and grouped by keeping relations of entities and tags with each other. The result of *sort 1* also suggests that thematically based categories are more appropriate for Chinese subjects to use in their organization of information structure.

Initial results of experiments provide us guidelines that any method of usability testing, which involves less number of subjects, can be used to test usability of information, categories and menu structure in Danish culture because results of Danish subjects are close to stereotypical structure of categories. In Chinese group, it is helpful to involve such kind of usability method which involves more subjects to see the difference of subjects from stereotypical sort.

Initial results of experiments also provide us guideline that color is an important factor in usability of applications. Foreground color of data and information is important for Danish subjects whereas Chinese subjects observe and judge by keeping background color of information as well in their mind. Usability of colors in information structure largely depends on target audience choice because Chinese subjects identified red color more than Danish subjects. Metaphor and association of colors also changes within culture. Metaphor of colors can help designers to imply such colors that are associated to specific culture for which that application. While comparing the Chinese and Danish subjects, Chinese subjects considered background color as part of their observation more than Danish subjects. These approximations can help designers to structure the graphic designing of interfaces to support Chinese users' potential need for considering the background color, and Danish users' potential need for considering the foreground when interacting with the computer.

FUTURE RESEARCH

The current study is a pilot for a larger project of cultural usability [2]. In this study, pictures of wedding cards are used to investigate the cultural difference in structure of categories. Future research will include cards for real application. It will also include alternate data collection modes such as interviews, direct observation of user behavior, and focus groups.

ACKNOWLEDGEMENTS

We thank Thomas Plocher, Weina Qu, Xianghong Sun and Qingxin Shi for their contributions to these pilot experiments. We also thank CBS and Chinese Academy of Science's volunteers in these experiments.

REFERENCES

1. Shen S, Wolley M and Prior S. *Towards culture-centred design* Interacting with Computers, 2006; 18,4: 820-52
2. Clemmensen, T. and Plocher, T. *The Cultural Usability (CULTUSAB) Project: Studies of Cultural Models in Psychological Usability Evaluation Methods*. Aykin, N. ed. Usability and Internationalization - Second International Conference on Usability and Internationalization, UI-HCII 2007, Held as Part of HCI International 2007, Beijing, China, July 22-27, 2007, Proceedings, Part I, Springer, Heidelberg, 2007, 274-280.
3. Clemmensen, T. and Goyal, S., *Cross cultural usability testing*. The First All India Human Computer Interaction Conference, (Bangalore, India, 6-7 December 2004, 2005).
4. Nisbett, R.E. *The Geography of Thought: Why We Think the Way We Do*. NY: TheFree Press (2003).
5. Del Galdo, E. M. & Nielsen, J. (Ed.) (1996). *International User Interfaces.* New York, NY: John Wiley & Sons.
6. Ji, L., Zhang, Z. and Nisbett, R. E. (2002). *Culture, language and categorization.* Unpublished manuscript, Queens University, Kingston, Ontario.
7. Nielsen, J., Sano, D. (1995) *User Interface Design for Sun Microsystems Internal Web.* Computer Networks and ISDN Systems, Vol. 28, 179-188
8. Rugg, G. & McGeorge, P. (2005) *The sorting techniques: a tutorial paper on card sorts, picture sorts and item sorts*. Expert Systems, 22(3)

Client Centred Design

Grounding design decisions through a strategic focus

Rikke Orngreen
Center for Applied ICT / CBS
orngreen@cbs.dk

Janni Nielsen
Center for Applied ICT / CBS
jn.caict@cbs.dk

Karin Levinsen
educational anthropology / DPU
kale@dpu.dk

ABSTRACT

In this paper we argue for the use of client centred preparation phases when designing complex systems. Through Client Centred Design human computer interaction can extend the focus on end-users to also encompass the clients' needs, context and resources.

Keywords

Client centred design studies, mutual learning, e-learning.

INTRODUCTION

In the spring 2002 the Human Computer Interaction (HCI) research group at Copenhagen Business School was asked to explore possible e-learning strategies for the Lundbeck Institute, an independent educational subsidiary company of the Danish medical company H. Lundbeck A/S.

The e-learning situations that the Lundbeck Institute wanted investigated aimed at end-users, who were primarily general practitioners, but also specialists (psychiatrist and psychologists), from all over the world. Traditionally, a development process utilising e-learning and HCI methods focuses on the end-users, their context and need. However, our general argument is that if an initial preparation phase also gives attention to the context and needs of the client, it is possible to uncover and build on existing resources within the client organisation (here the Lundbeck Institute), leading to better grounding of design decisions.

The study and concept of Client Centred Design builds on an action research study [1], where the HCI research group in close cooperation with the Lundbeck Institute initiated a mutual cooperation and learning process. The first nine months we slowly unfolded the idea of an e-learning project, after which the Lundbeck Institute funded the preparation phase, a sort of feasibility study, which ran four more months. The study was named KA-CHE: Knowledge Acquisition in Continued Health Education / Computer-Human Environments. The authors of this paper were, at the time of the project, all part of the HCI research group and the KA-CHE project.

THE RESEARCH AREA

Cato warns against the "creation trap" where clients too early in the process claim that: "*we know what we want; 'don't waste any more time exploring and understanding. Just get on and create it.*" [2, p. 20]. However, he does not involve the client directly, and involvement of users is restricted to user tests. Bødker and Sejer Iversen argue that methods are often taken "off the shelves" rather than chosen on the basis of pre-analysis and grounded decisions [3]. The tendency is to jump directly from an identified problem to working on solutions. Reflections on and collaboration with clients and the building of a mutual knowledge base for grounding decisions seem rare in the HCI literature. Exceptions seem to be methods dealing with the design and management of processes, from the initial idea of a project to the final delivery, e.g. the MUST-method [4], the Holistic Approach [5] and the Managing Multimedia and Web Design [6].

Many larger publications, such as basic HCI textbooks, do not touch upon the initial phase where clients resources (existing initiatives, competencies etc.) are studied, but consider the more traditional issues of involving the client and/or users in the actual design process [e.g. 7,8,9]. A general approach is to stress the importance of HCI and User Centred Design in terms of bad (and very convincing) examples and economic arguments, followed by definition of core concepts and description of HCI methods. It is interesting that according to the textbooks, involvement of HCI-experts begins when the nature and purpose of the interactive system has been decided [8]. Even publications on methodological perspectives on e-learning embedding HCI activities do not mention pre-analysis and grounding of choice among methods [e.g. 10,11,12].

We find that a primary focus on end-users may result in suggested solutions that do not contemplate client's means, resources and needs. We suggest that a client centred approach may enhance the match between the users' and the client's needs and context, hence a better grounding of design decisions.

THE CASE STUDY

The Lundbeck Institute wanted to explore the possibilities for offering accredited online courses within their field. The basis for this was present and forthcoming governmental regulations throughout the world requiring general practitioners to take a certain number of accredited courses each year.

The HCI research group generated empirical material from several sources, e.g. interviews, observation, explorative collaborative sessions with participants from the Lundbeck Institute, analysis of the company's work processes and context as well as the current educational practice in general. Our interpretation of the data material had a strategic focus in relation to the development process and possible solution, rather than the actual production of a concrete solution.

In this specific project, our client centred design approach lead to a strategic framework, which was directly tailored to the client's organizational needs and resources. This specific framework consists of a variety of e-learning and dissemination strategies from which was derived steps to approach the development process for large scaled e-learning in complex contexts. Our work process was explorative, giving space for recognising that 1) there may already be ways of working in the organisation, which contains inherent possibilities; 2) validated knowledge may, when viewed from another perspective, give reasons for concern.

A brief example is how the issue of accreditation, which the Lundbeck Institute regarded as something that was guided by regulations. The interaction design was therefore foreseen as a stand-alone type of system, where content could easily be identified, accredited and used in a fact-based test. In the HCI research group we reviewed existing e-learning initiatives within other medical areas and found that the offered systems had an instructional pedagogy, with "page-turning" interaction forms. They allowed the general practitioner to "guess the right answer" and through this acquire the required number of points. This was quite in contradiction to the Lundbeck Institutes existing face-to-face activities, which were more constructivist and interactive, but very much in line with what they presented to us as a viable online design solution. This was somewhat of a paradox and it served as a perfect basis for a dialog on what the Lundbeck Institute really wanted and how they saw themselves interacting with users online. In turn this led to discussions on the difference in competencies needed when running stand-alone applications as opposed to collaborative e-learning systems. The example demonstrates how the pre-phase came to deal with issues that not only related to the design and management of the envisioned e-learning system, but which would influence the Lundbeck Institute as a whole, and how the Institute would be perceived by end-users.

KA-CHE was a typical project where the actual project is preceded by a process of clarification and negotiation of meaning. In this process the client's contextual knowledge, needs and visions meet with the researchers' competences, scientific interests and experiences. But KA-CHE was special in that the Lundbeck Institute not only allowed for using a considerable amount of resources on a pre-study, but also that the contact persons within the organisation succeeded in working in this very explorative manner and became collaborative partners. At times it was very frustrating for the participants from the Institute, because neither they, nor we, were able to see where we were heading, but also because they were not used to work under such floating and drifting conditions, where nothing tangible was produced.

At the end of the KA-CHE pre-phase, it became clear that we had worked through a number of themes in an iterative manner. Those themes turned out to vitally influence our design considerations. However, they were not the ones we started out with or the ones we could have foreseen. They were the consequence of constantly questioning the knowledge we had during the process. This allowed new themes to emerge and influenced our perspective and changed our view on the initial theme. These interrelations could not be identified beforehand but unfolded gradually.

FINDINGS

The Client Centred Design approach did not result in specific design solutions, but focused on current and future critical questions to ask, further steps to explore and opportunities to investigate within this particular project. Client Centred Design bears similarities to the well documented approach within the field of business economics known as feasibility study [13], but differs from traditional feasibility studies in two ways:

1. Feasibility studies are focused primarily on analysis, where the Client Centred approach is much more orientated towards collaboration, dialogue and mutual learning.
2. Both approaches focus on learning about the client's current activities, resources and competencies. But traditional feasibility studies aims at recommendation of best solutions, Client Centred Design aims at raising questions about what the client needs to consider when contemplating a large complex project.

We suggest that decisions about forthcoming strategies must reflect and build on (but not be limited to) the client's competences and resources, as well as on reflections on the client's ability to provide for a set of possible solutions.

AKNOWLEDGEMENT

We thank the Lundbeck Institute for an openness - which is rarely found. In particular thank you to Janne Pamsgaard and Ole Mortensen who invited us into their world.

REFERENCES

[1] Susman, G. and Evered, R., 1978: "An Assessment of the Scientific Merits of Action Research", in Administrative Science Quarterly, Vo. 23, no. 4, dec 1978, p. 582-603

[2] Cato, John, 2001: User-centered web design, Addison-Wesley

[3] Bødker, Susanne and Sejer Iversen, Ole, 2002: "Staging a Professional Participatory Design Practice – moving PD beyond the Initial Fascination of User Involvement", in *proceedings of NordiCHI*, Oct. 19-23, 2002, pp.11 – 18

[4] Bødker Keld, Finn Kensing & Jesper Simonsen, 2000: Professionel IT-forundersøgelse (Professional IT pre-analysis), Samfundslitteratur, Denmark.

[5] Christensen, Marie & Harder Fischer, Louise, 2004: Developing Multimedia - A Holistic Approach. Nyt Teknisk Forlag, Denmark.

[6] England, Elaine & Finney, Andy, 2002: Managing Multimedia, 3rd edition, Pearson

[7] Dix,Alan; Finlay, Janet; Abowd, Gregory and Beale, Russel, 2004: Human-Computer Interaction, 3rd edition, Pearson/prentice Hall.

[8] McCracken, Daniel D. and Rosalee J. Wolfe , 2004: User-centered website Development. A Human-Computer *Interaction Approach*, Pearson/Prentice Hall 2004-05-11

[9] Preece, Jenny; Rogers, Yvonne and Sharp, Helen, 2002. *Interaction Design*, John Wiley and sons.

[10] Iacucci, Giulio and Kuutti, Kaari, 2002: "Everyday Life as a Stage in Creating and Performing Scenarios for Wireless Devices", in Personal and Ubiquitous Computing, Volume 6 Issue 4, January 2002, p.299-306

[11] Urnes, Tore; Weltzien, Åsmund; Zanussi, Anne; Engbakk, Solveig and Kleppen Rafn, Julie, 2002: "Pivots and structured play: stimulating creative user input in concept development", in Proceedings of the second Nordic conference on Human-computer interaction, October 2002 Aarhus, Denmark, October 19 - 23, 2002,p. 187 – 196

[12] Vass, Marc; Carroll, John and Shaffer, Clifford, 2002: "Supporting creativity in problem solving environments", in Proceedings of the fourth conference on Creativity & cognition, October 2002, Loughborough, UK October 13 - 16, 2002

[13] Wikipedia.com, 2007, http://en.wikipedia.org/wiki/Feasibility_Study, accessed 1. november 2007

Erotic Life – an issue in HCI?

Olav W. Bertelsen & Marianne Graves Petersen
University of Aarhus, Department of Computer Science
Aabogade 34, DK-8200 Aarhus N, Denmark
{olavb, mgraves}@daimi.au.dk

ABSTRACT

In this paper we argue that IT, in particular in the home, tends to marginalize erotic aspects of life, through developing domestic technology, without considering how it impacts conditions for erotic life in the home. We suggest the need for a counter discourse in HCI, and we outline a number of theoretical and empirical perspectives, which can contribute to establish erotic life as a new frontier in HCI.

1. INTRODUCTION

This paper is an abbreviated and edited version of a short paper given at the 2007 British HCI conference [1].

HCI in the home context provokes the rationalities of designing for a workplace, the domain out of which HCI was born and has developed from. However, apart from the CHI 2006 workshop [2], a perspective on sex and eroticism is almost totally absent in today's HCI.

Erotic life embraces a spectrum from the erotic atmosphere (or ambience) via the light flirt, to the concrete conditions for realizing the sexual intercourse. Basically, there are two ways of looking at how IT influences everyday erotic life. One approach is to focus on designing interactive technologies to support erotic experiences, and a second strategy is to look at how the design of mundane everyday technologies influences conditions for erotic life. Some people do involve interactive technology in their erotic life, but so far this area has received very little attention from the HCI research community. There is an increasing interest in introducing sensor technologies in the home, e.g. to infer availability status [5]. Such systems impact conditions for exercising erotic life, but this issue is not even touched upon nor linked to the issue of availability. Thus, as technology becomes more and more ubiquitous, we have to consider erotic life as part of our understanding of human-computer interaction, in order to avoid designing sterile deserts.

The ideals of efficiency and the focus on tasks have seamlessly drifted into the domestic computing area, even though there have been a number of warnings against this tendency. The focus on erotic life is a useful provocation in maturing the field of HCI to embrace the characteristics of home life and the private intimate spheres, as it inherently contradicts ideals from the workplace, as this is perhaps the most inefficient and non-work activity taking place in a domestic context. In this context the traditional HCI criteria may be insufficient and we therefore have to roll back to more general criteria such as the ideal of improved life quality [4]. As pointed out by, e.g. humanistic psychology, sexual satisfaction is important for a complete life. Thus, maintaining life quality as a basic criterion in IT design implies that quality of erotic life should also be accounted for.

IT does have an impact on eroticism, and sexual practice. A recent investigation suggested that couples that have television in their bedroom have sexual intercourse half as often as those who do not [8]. On the other hand the TV set can also be used for watching pornography as inspiration or as part of the sexual activity. So obviously, the issue is complex, and technology can serve as an enabler as well as a disabler. That is, sometimes the effects of the new technologies are positive, but most often it seems that intimacy is jeopardized as these workplace centric technologies invade private life. This is a problem, as it seems that many of the new technologies entering into the private space (in combination with an intensified working life) are significant factors in making sexual life difficult for many couples today.

What is striking in the context of HCI, however, is that investigations on how technology design influences our erotic life, let alone make way for new erotic experiences, is almost completely absent from the research field. With this paper, we propose to start such investigation. As a first step towards a foundation for erotic life in HCI, we outline and discuss a series of relevant themes.

2. INTIMACY IN FAMILY LIFE

Postmodern family life, where people are part of multiple and changing social groups and possibly live in changing or network families, threatens the family as a site for true intimate relations [3]. The family has become a specialized sanctuary for intimacy. Research into technologies connecting, people who live apart, to some extend address this issue [7]. However, the paradigm of anything, anywhere anyhow is a double-edged sword in this respect, as it holds for lovers as well as for others, and thus may seriously interfere with intimate situations. Furthermore, it has been pointed out that the increasing fraction of families where both adults work full time tend to shift their relationship into one where negotiations around time, and the right to work more and more hours take up a lot of attention [3]. People seem to be caught in a time trap when work becomes family and family becomes work [5]. At work, there is a focus on self-realization and social relationship with colleagues, whereas home life concentrates on the practical tasks, which need to be accomplished and which are increasingly outsourced.

To address this challenge we may aim to design for unexpected openings, illogical combinations, which can support erotic impulses and erotic play. The coarse example would be to have a

random four hour power outage two times each week (this "approach" at least proved to work during world war two).

3. COMMUNICATION IN EROTIC LIFE

According to the general sexology literature, inability to communicate seems to be the most common reason for divorce and similar problems [6]. The ability to communicate is not necessarily of key importance in the early phases of a relationship, when sexual tension and the attraction of the opposite are drawing the couple together, but communication patterns established early in the relationship are important later on [ibid]. Differences in vocabulary and the lack of experience in talking about sex are obvious sources for problems in maintaining a sexual relationship. The literature on marriage counseling also points to the general mode of communication as often being problematic, e.g. communication patterns developed between siblings, focusing on blaming the other part, or patterns focusing on winning the argument lead to problems when applied in the relationship.

Interactive technologies present in the home impact communication in several ways. The discussion on the time trap [5] indicates that communication has degenerated into negotiation, substituting intimate communication with technical rationality. The constant opportunity to communicate with people outside the home and the constant stream of media contents seems to be negative factors as pointed out above. A low-tech approach would be to reduce the impact of the disabling technologies, e.g. by cutting off the media stream and by defining specific time slots for external communication. Along the same lines, defining time slots for talking together, or having a shared diary could compensate for the missing communication.

An intimate communications perspective provides a clear departure away form the hegemony of technical rationality, helping the erotic back from its exiled position as residual category.

4. THE WAY FORWARD

Theoretically and intellectually, we point to perspectives that can frame this complex issue in the field of HCI. For this new discourse, it is important to integrate knowledge from medical, sociological, sexology, and therapeutic practice dealing with erotic life and its conditions in modern families. There are opportunities for focusing on communication around erotic experiences and for investigating the tension between technologies that are invisible and visible in use. Finally, the emerging interest in designing for fun in HCI can serve to frame a new perspective on designing for erotic life, and the conditions for exercising this in a playful way, rather than the prevalent medical approaches to problems in erotic life, as is highly prevalent in the western world. It is important, also, to realize that many issues related to sex and information technology are not necessarily part of HCI; e.g. various forms of abuse, or the diffusion of pornography through the Internet.

The starting point, for the erotic life-oriented HCI design approach we will suggest, is that we don't think that IT necessarily should have a role in peoples sexual life. Because, however, current technologies do have a negative effect in many cases these effects should be counterbalanced by deliberate design for erotic life. We should avoid solutions that make erotic life difficult, e.g. by extending workplace rationality into the home, and aim for solutions that provide enablers for erotic life activities, e.g. by providing privileged room for intimate communication. We also suggest that designing opportunities for playfulness, unforeseen fun and inventiveness in erotic life activities is important, as a way to help people maintain focus on their marital relation.

Methodically, HCI and interaction design for erotic life is a challenge. We are faced with new criteria that most established methods do not address, and because intimacy is intimate and private, it is by nature difficult for outsiders to observe. We expect that many established methods that address open design situations, like rapid prototyping with users and participant observation studies will be awkward to apply in this new field. Other approaches such as dairy based studies, and qualitative interviews are more promising, but should be adapted to the fact that most people consider sex and erotic life very private. Close collaboration with various therapists may also be a fruitful method in particular if combined with rapid cycles of design, use and redesign of IT-solutions.

These difficulties also impact the possible approaches to evaluation and validation. The criteria for success are hard to define, as a good erotic life most likely cannot be measured in terms of the frequencies of sexual intercourse in the couple, or other exact measures. For HCI to succeed in this new field collaboration with, and integration of knowledge from other disciplines is important. This may also be a challenge to those disciplines. E.g. medical sexology tends to rely exclusively on epidemiological approaches that are less suited for generating an understanding of the dynamics of intimate relations and the creation of erotic moments. Thus, design for erotic life, will probably provoke development in other disciplines.

For HCI in general erotic life is important in unfolding the experience oriented turn, in addressing the situation of use in a broader perspective, and in provoking the refinement of methods.

5. REFERENCES

[1] Bertelsen, O. W., Patersen, M. G. (2007). Erotic Life as a New Frontier in HCI. *Proc HCI 2007, Volume 2*

[2] Brewer, J., Kaye, J., Williams, A., Wyche, S. (2006). Sexual interactions: why we should talk about sex in HCI. *CHI '06 Extended Abstracts* ACM Press, 1695-1698.

[3] Dencik, L (2001) Living in Modern Times: Implications for the Lives of Children and their Families. Opening plenary lecture at the International Conference of the International Commission on Couple and Family Relations, Stockholm. http://www.baff.ruc.dk/Reports/pdf_reports/no4.pdf

[4] Ehn. P., Eriksson, B., Eriksson, M., Frenckner, K., Sundblad, Y. (1984). *Utformning av Datorstödd Ombrytning för dagstidninger*. Graphic Systems, Göteborg.

[5] Hochschild, A.R. (1999). *The time trap - when work becomes home and home becomes work*. NY: Amacom.

[6] LeVay, S., Valente, S. M. (2006). *Human Sexuality*. Sunderland MA: Sinauer Associates.

[7] Nagel, K. S., Hudson, J. M., Abowd, G. D. 2004. Predictors of availability in home life context-mediated communication. *Proc. CSCW '04*. ACM Press, 497-506.

[8] Politiken (Article in Danish Newspaper) 17.1.2006 "A TV in the Bedroom stops the lust".

Can eye tracking bring new life to retrospective think-aloud?

Sune Alstrup Johansen
IT University of Copenhagen
Rued Langgaards Vej 7
DK-2300 Copenhagen S
sune@itu.dk

ABSTRACT
The think-aloud method has been widely used for usability evaluation within academia as well as amongst usability professionals, and in recent years it has consequently reached a status as the 'golden standard' for usability testing. Another variant of the think-aloud method, where users are asked to think-aloud retrospectively as opposed to concurrently, has received much less attention. New developments in eye tracking technology has made it possible to measure the eye movements of users in a quick and precise way, enabling researchers to use video recordings with eye movement overlay to support and facilitate the retrospective think-aloud. When using this methods results are promising, as studies show that more problems are discovered using eye tracking videos for retrospection, and due to evolution of eye tracking technology, today this method is relatively easy to apply. More work needs to be done, but it may be that eye tracking technology have brought new life to the retrospective think-aloud method.

Author Keywords
Usability evaluation, usability testing, eye tracking, think-aloud, retrospective think-aloud, verbal protocols.

INTRODUCTION
Over the last two decades much research has been done on developing and describing usability evaluation methods, such as the think-aloud method [4], heuristic evaluations [12,13], cognitive walkthroughs [19]. In recent years the think-aloud method has probably been the most widely used usability method within the industry. It has been so popular that people have called it 'the golden standard', and Jakob Nielsen named it, "the single most valuable usability engineering method" [14].

However, there are some well known disadvantages with making users think aloud during task solving, eg. concurrent think-aloud will have a negative effect on users' task performance, and think aloud may distract users' attention on the interface as well as the concentration for the task at hand. [17]. This is why some researchers have suggested using retrospective think-aloud instead [5], a method where users are asked to complete the tasks without thinking aloud, but instead are to verbalize their process afterwards [3]. Such retrospective protocols have received much less attention than the concurrent think-aloud method, but a recent study has in fact confirmed the validity and reliability of the retrospective protocols [7]. Traditionally video recordings has been used to support the retrospection, but this paper will argue that eye tracking recordings is a promising tool for supporting the retrospective protocols.

EYE TRACKING
Visual perception is an essential part of users' interaction with interfaces, and modern eye tracking equipment makes it possible to record and analyze interesting parts of this process such as: Which elements are actually seen? Where do users look first? What do users spend time looking at the most? In the past eye tracking has been criticized for being costly and tedious [1,18], but state-of-the-art eye tracking equipment has solved some of these problems, and accurate recordings of eye movements can be made with non-intrusive eye tracking screens. This is part of the reason, why the application of eye tracking technology in usability studies is clearly blossoming [9,15]. Further, eye tracking has proved to be a valid method for discovering usability problems [2,6], and is thought to provide an indication of the amount of cognitive processing required to interact with an interface [16].

Retrospective think-aloud supported by eye tracking
When using the retrospective think-aloud method with eye tracking, usability researchers can let users interact with an interface without disturbance, and afterwards a video sequence with an overlay of eye movements can be shown to the users to support verbal protocols. Such gaze recordings have already proven to give users a more precise recall of their thoughts [8], than traditional video recordings, and recent studies show that this has improved the data collection from retrospective verbal protocols, and made the method more interesting to usability evaluation.

One study shows that even moderators without previous training in eye tracking analysis were able to discover more usability problems using retrospective think-aloud [10] than traditional concurrent think-aloud. However, the

retrospection was a lot more time consuming than concurrent think-aloud, so when moderators where asked about the perceived benefits of the method, only half of them thought it was worth the extra time to do a retrospection.

Similarly another recent study shows that the amount of verbal protocols collected is much higher when using eye tracking supported retrospection [11]. However, in this study it is still not clear whether the higher amount of verbal protocols did actually lead to a higher amount of discovered usability problems. This work is still in progress.

One thing is sure though, when using retrospective protocols the process is more natural for the user. An increase in speed and focus on the task at hand has been observed, resulting in significantly higher task-completion rates than when using the conventional think-aloud method [2]. Furthermore in a recent study the experience of evaluation using retrospective think-aloud method is perceived as being subjectively more pleasant by the users doing the testing [2].

CONCLUSION AND FUTURE WORK

This paper argues that the use of eye tracking to support retrospective think-aloud will improve the results of this method making it more interesting as an alternative to the concurrent think-aloud. A higher amount of verbal protocols is collected, and more usability problems are discovered when using eye tracking. Without regard to the extra time and costs of applying the method it would be an obvious choice, but a lot of work still needs to be done to settle on whether the higher amount of data gathered will make it worth the while.

Furthermore there is work to be done in defining the best way of applying eye tracking to retrospection, e.g. at what speed should the gaze videos be replayed to avoid confusing the users, should only parts of the video be replayed, and should moderators mark specific events in the video recording during users' task solving?

REFERENCES

1. Aaltonen, A. Eye Tracking in Usability Testing: Is It Worthwhile?, Usability & eye tracking workshop at CHI'99, (1999).
2. Ball, L. J., Eger, N., Stevens, R., & Dodd, J. Applying the PEEP Method in Usability Testing, Interfaces, 67 (2006), 15-19.
3. Branch, J.L. Investigating the Information-Seeking Processes of Adolescents: The Value of Using Think Alouds and Think Afters. Library & Information Science Research. 22,4 (2000), 371-392.
4. Ericsson, K. A. & Simon, H. Protocol Analysis: Verbal Reports As Data, Revised Edition, MIT Press, Cambridge, MA, (1993).
5. Gapra, M.G. Comtemporaneous versus Retrospective Userreported Critical Incidents in Usability Evaluation. In Proceedings of the Human Factors and Ergonomics Society, 46th Annual Meeting. (2002), 1973-1977.
6. Goldberg, H. & Kotval, X. P. Computer Interface Evaluation Using Eye Movements: Methods and Constructs, International Journal of Industrial Ergonomics, 24 (1999), 631-645.
7. Guan, Z., Lee, S., Cuddihy, E., & Ramey, J. The Validity of the Stimulated Retrospective Think-Aloud Method As Measured by Eye Tracking, Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (Montréal, Québec, Canada, April 22 - 27, 2006), (2006), 1253-1262.
8. Hansen, J. P. The Use of Eye Mark Recordings to Support Verbal Retrospection, Acta Psychologica, (1990), 31-49.
9. Jacob R. J. K. & Karn, K. S., Eye Tracking in Human-Computer Interaction and Usability Research: Ready to Deliver the Promises, in Hyönä, J., Radach, R., &Deubel, H. The Mind's Eye: Cognitive and Applied Aspects of Eye Movement Research, Elsevier, (2003)
10. Johansen S.A., Alternatives to eye-tracking - Investigating validity of low-cost methods, IT University of Copenhagen (2005)
11. Lehtinen, M., Hyrskykari, A., & Räihä, K-J., Gaze Path Playback Supporting Retrospective Think-Aloud in Usability Tests. Proceedings of COGAIN 2006 (2006)
12. Nielsen, J. Finding Usability Problems Through Heuristic Evaluation, Proceedings of CHI'92, (1992), 373-380.
13. Nielsen J., Heuristic Evaluation, in Nielsen, J. & Mack, R.L. Usability Inspection Methods, (1993) 25-62.
14. Nielsen, J., Usability Engineering, Cambridge, MA: AP Professional (1993)
15. Poole A. & Ball, L. J., Eye Tracking in Human-Computer Interaction and Usability Research: Current Status and Future Prospects, in Ghaoui, C. Encyclopedia of Human Computer Interaction (in Press), Idea Group, (2007)
16. Rayner, K. Eye Movements and Information Processing: 20 Years of Research, Psychological Bulletin, 124, 3 (1998), 372-422.
17. Russo, J.E., et al. The Validity of Verbal Protocols. Memory and Cognition. 17,6 (1989), 759-769.
18. Schnipke, S. K. & Todd, M. W. Trials and Tribulations of Using an Eye-Tracking System, Proc.CHI 2000, ACM Press, (2002), 273-274.
19. Wharton C. et al., The Cognitive Walkthrough Method: A Practitioner's Guide, in Nielsen, J. & Mack, R. Usability Inspection Methods, John Wiley & Sons, (1994), 105-141.

A User Interface Issue in 1956: Preserve the Keystrokes in Usable Form

Anker Helms Jørgensen
IT University of Copenhagen
DK-2300 Copenhagen S Denmark
anker@itu.dk

ABSTRACT
As part of my explorations of User Interface History, I'm here focussing on the office context in the 1950s, well before user interfaces were conceptualized. The paper presents the concept of *Common Language*, proposed by Harold S. Levin in 1956 in order to meet an overriding contemporary concern: preserve the key strokes in usable form, hereby avoiding retyping of data.

INTRODUCTION
My approach to the history of user interfaces takes the mundane aspects as starting point [7]. This approach contrasts other approaches, e.g., by Manovich [9] that focus on early visionaries such as Bush, Engelbart and Kay. As the office certainly is mainstream and has been invaded by computers and software long ago, it seems an appropriate candidate for historical studies.

Indeed, the office and the interface have met: Interface issues in office applications have been addressed widely in HCI – to the extent that word processors have been denoted the *white mice* of HCI [4]. This meeting has been fruitful, resulting in adoption of office concepts in the UI realm, such as menu naming conventions (*edit* and *file)* and the overarching *desktop* metaphor.

What were the origins – what was the basis for these UI developments? Historians look for lines, breaks, and transitions. In accordance herewith I will flash back to the 1950s and look for traces. By then there was a wealth of equipment in offices – of course with interfaces – but the conception of the user interface had not yet emerged.

Among the relevant sources from the mid-1950s are *Office Work and Automation* by Levin [8] and *Office Automation* by Brown [2] – to my surprise shaped in the veil of Office Automation, a field that otherwise only emerged in the 1980s. These books abundantly present office work issues, equipment, market, management, forecasts, etc. In Levin's book [8] I found one aspect particularly relevant: The call for a *Common Language*. This paper focusses on Levin's call circumscribed in the mid-1950s market context and identifies traces to later UI developments.

THE MARKET CONTEXT IN THE MID-1950S
Business data processing has a long history with mechanical and electromechanical punch card devices such as collators and tabulators[1], based primarily on punch cards. (Note that magnetic tape was not yet around in the mid-1950s, let alone disks.) In the blossoming post-war economy the need for business tools flourished, such as payroll handling and inventory control. This period was featured by *transition*, where the electronic calculator was reshaped from a science/engineering instrument to an automatic information processing machine.

In addition to transition, the market was featured by *diversity* as three quite different types of manufacturers dominated: a wealth of traditional business information processing companies such as IBM and NCR; many electronics companies such as General Electric; and a few start-up companies such as Electronic Control Company that developed UNIVAC, the first commercially available computer in the US. As an example of this pele-mele, NCR created a brilliant success in 1956: the Post-Tronic, an electronic enhancement of the company's ordinary bank accounting machines.

Already in the mid 1940s, the creators of ENIAC John W. Mauchly and J. Presper Eckert had seen the potential of the digital computer in business information processing. They pursued this vision and launced UNIVAC in 1951, targetted for businesses. But early digital computers were notoriously unreliable and applications were scarce and costly to develop. Hence there was a considerable resistance towards huge investments in a relatively unproven technology. To illustrate the general lie of the land: as late as in 1959, 65% of IBMs income in the US came from punch card equipment – and even 90% overseas. Given this state of affairs, standardization of formats etc. as we know it today was very far away. Within this context, Levin launched his call for a *Common Language*.

LEVIN'S COMMON LANGUAGE
Initially Levin outlined the situation: "At best, initial handling in today's office is costly, time consuming, and subject to high error rates. It is an area in which we can anticipate a good measure of further technological progress." (44). He goes on to address the origin of information: "The information … has a point of origin ... information is ultimately recorded by key depressions on office machines." (20) He then airs the overriding concern: "It is common for these key strokes to be repeated many times during the handling of a single transaction … for example sales order, invoicing, payment, financial records." (20). Not only is sheer repeated typing of information a

[1] This section is based on [3] and [6].

problem, but also reinterpretation: " … major emphasis on reducing the need for clerical reinterpretation ... " (19).

In order to meet these problems, Levin proposed a *Common Language*, including a set of dialects: "A Common Language enables machines to interact. This interaction makes possible a flow of office work in which human translation is minimized." (19) He stated "The goal is to record data in a language understood by data-processing machines within the information handling cycle." (19). He expanded the idea of the Common Language to the wider concept *Integrated Data Processing* or *IDP*.

One thing is exchange of information between existing office equipment – another the coming computers: "Where today a satisfactory common language must have wide compatibility with machines of different manufacture and purpose, the common language of tomorrow may be judged on its efficiency in communicating with a single kind of machine, the electronic computer." (41).

Surprisingly, the Common Language was not a thing of the future: "Machines have been developed which produce a machine language … specialized typewriters, adding machines, cash registers, bookkeeping machines, and communication devices whick talk a common language. Such machines produce records of key depressions and machines operations which can be fed directly into a wide range of dataprocessing equipment." (20).

The essence of the Common Language is: "The essential consideration is that keystrokes needed for later use … can be preserved in usable form." (25).

Now, what does this Common Language look like? What is the syntax, the lexicon, the grammar? The Common Language is not a language, it is a 5-hole paper-tape format. And the dialects come in two types: paper tape with 6, 7 and 8 holes, and punch cards.

DISCUSSION

It is interesting to see that interaction as we know it today is not addressed by Levin. The interface is merely perceived thus: "information is ultimately recorded by key depressions on office machines" (20). Today it is hard to imagine the bulk of the *retyping* 50 years ago. This problem has largely been eliminated, but not quite. It lingered several decades after the 1950s, here expressed as a UI design guideline from 1993: "Don't require retyping of remembered information" [11]. The *integration* aspect has undoubtedly been improved by several magnitudes since the mid-1950s. But even 30 years later, lack of integation was an important issue in office applications [10]. Even today we are short of integration between web-based systems and traditional GUI systems – although things are rapidly improving.

Given the later all-encompassing interaction and interactivity between users and computers, it is interesting to note Levin's terminology: *language, dialects, understand*, and *talk*. Only in the 1960s and 1970s a related terminologi was employed in the UI arena about the communication between users and computers, such as *conversational* and *dialogue*. These terms have even been replaced by the more generic term *interaction* where the language aspect is downplayed, partly due to the current bodily and tactile aspects of interaction [5]. Further on this note, Alt employed the term input and output *organs* in 1951 [1], indicating some sort of organism, even further away from present day interaction jargon.

So far in my explorations, it is unclear how much the Common Language caught on. An article by Haigh [6] mentions the concept in passing. My impression is that the 5-hole paper tape faced an ill fate as the punch card by far was the most common medium for data storage and communication in the mid-1950s and well into the 1960s.

Qualification

An obvious weakness of this study is the limited source material, namely solely Levin's book. The book is of US origin and addresses only US issues, but as most other countries were lagging markedly behind the US regarding development of the digital computer, the focus on the US seems well justified.

REFERENCES

[1] Alt, F. (1951): Evaluation of Automatic Computing Machines. Product Engineering, Nov. 1951.

[2] Brown, R. H. (1955): Office Automation. New York: Automation Consultant.

[3] Campbell-Kelly, M. and Aspray, W. (1996): Computer: A History of the Information Machine. Westview Press.

[4] Carstensen, P.H. (1987): Personal comm., May 1987.

[5] Dourish, P. (2001): Where the Action Is. MIT Press.

[6] Haigh, T. (2001): The Chromium-Plated Tabulator: Institutionalizing an Electronic Revolution, 1954-1958. IEEE Annals of the History of Computing 23:4, 75-104.

[7] Jørgensen, A.H. (2006): Exploring the History of User Interfaces: The Myth of Xerox Parc and Other Oddities. Proc. 6th Danish HCI Research Symposium, Aarhus, Nov. 15, 2006, 29-30.

[8] Levin, H S. (1956): Office Work and Automation. Wiley.

[9] Manovich, L. (2007): Alan Kay's universal media machine. Northern Lights, vol. 5, 39-56.

[10] Nielsen, J., Mack, R. L., Bergendorff, K. H., and Grischkowsky, N. L. (1986): Integrated software in the professional work environment: Evidence from questionnaires and interviews. Proc. CHI'86, 162-167.

[11] Nielsen, J. (1993): Usability Engineering. Academic Press.

Perceptual Depth to Enhance Change Detection

Gabriela Mancero g.mancero@mdx.ac.uk

William Wong w.wong@mdx.ac.uk

Interaction Design Center
Middlesex University
The Burroughs
London, NW4 4BT

Previous research have shown that observers focused on one aspect of a dynamic scene often fail to notice unexpected stimuli[1]. Subjects in one experiment monitored game footage that lasted 75 seconds. The video presented two teams of people passing a basketball. A woman in a gorilla costume or a woman with an open umbrella walked through, staying in sight for 5 seconds. Observers, busy counting the number of passes completed by each team, failed to notice the gorilla almost half the time [2].

In real work environments, unobserved changing information could have disastrous outcomes. Operators of air traffic control centres or hospital emergency rooms need to monitor and track a large volume of information that changes rapidly and may need to be kept within given safe operational limits.

Visual displays often use *transients* - detectable visual cues - to signal a change in the environment over time. Recent research in complex domains suggest that design approaches that used transients such as highlighting, boxing or flashing, are not always successful[3]. Therefore, we hypothesise that the use of perceptual depth might make changes more conspicuous.

Previous studies have used stereoscopic depth[1] but users were required to don goggles for viewing computer-generated images. A new technology known as the Multi-Layered Display (MLD) provides physical depth by placing one LCD in front of another LCD, separating them by a 14 mm Perspex layer. Therefore, with the MLD there is no need for special goggles to see depth (Figure 1).

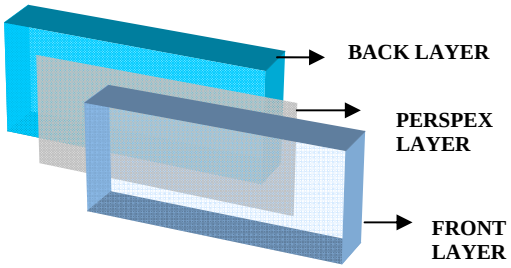


Figure 1: Schematic MLD

[1] Sensation of depth that emerges from the fusion of the two slightly different projections of the world on the two retinas

Experimental Design

Data from 52 participants was analyzed. All subjects had normal or corrected to normal vision. Participants were seated 60 cm away from the MLD.

The experiment presented a 2 x 2 x 2 (Depth plane x Position of the unexpected event x Colour) factorial design.

Detection Task

Eight balls, 4 red and 4 blue moved independently on random straight paths at a variable rate ranging from 10 to 40 frames per second. Observers were instructed to do a mental count of the number of times balls of a designated colour hit a black bar located at the bottom of the display (Figure 2).

Each trial lasted 30 seconds, and each observer completed 5 trials. Following each trial, observers wrote down how many hits they counted.

Fifteen seconds into the third trial, a cross with the same horizontal and vertical extent as the balls entered from the right side of the display, moved horizontally in a linear path across the screen, and exited the left side of the display, remaining visible for 5 seconds. The first two trials did not present the unexpected event.

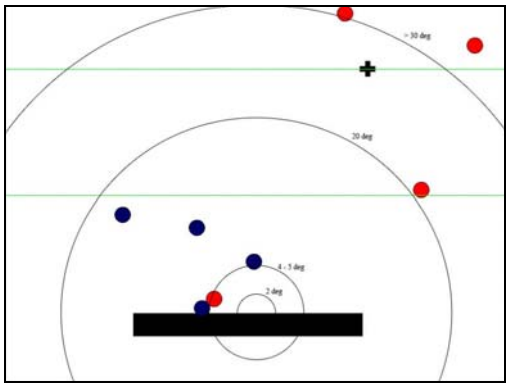


Figure 2: Sample Condition Single Layer. The lines and labels shown were not present in the experimental display. They have been added to indicate the distance of the cross from the black bar. Degrees of visual angle: Foveal vision 2º, parafoveal vision: 4 - 5 º, central foveal region 20 º useful field of view FOV: 30 º, peripheral region >30 º

Findings:

- Only 56% of observers notice the unexpected event while they were engaged in a primary monitoring task when not alerted about the existence of it, which increased to 69% detection when participants were implicitly alerted.
- Detection is 3 times higher when the unexpected event is located in the front layer within 20 degrees of the focus of attention (Figure 3).
- Positioning the unexpected event in the front layer makes it highly noticeable, especially when the rest of the stimuli are located at the rear layer.

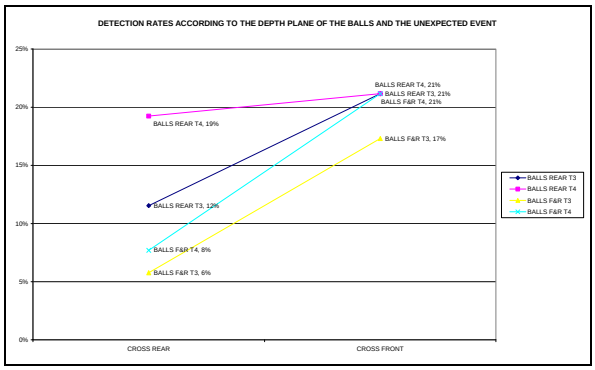


Figure 3: Detection rates based on the balls' depth plane location

Discussion

Our study has replicated some of the results found in previous research and have demonstrated a robust phenomenon of sustained inattentional blindness for controlled, dynamic events. However, results showed an important depth effect in detection of stimuli that is located close to the fixation point regardless if the participant is alerted or not of its presence.

This experiment is part of study to understand how information layering techniques can be used to enhance change detection. The next step of the project will explore the use of perceptual depth as a cue to enhance change detection in static interfaces to examine in more detail how well they support the recognition of a given change as being relevant to the successful achievement of the task. In complex environments, failure to perceive the meaning of these changes can push process control outside its safety boundary.

References

1. Mack, A. and I. Rock, *Inattentional Blindness: An Overview.* Psyche, 1999. **5**(3).
2. Simons, D.J. and C.F. Chabris, *Gorillas in the midst: Sustained Inattentional Blindness for Dynamic Events.* Perception, 1999. **28**(9): p. 1059-1074.
3. Fisher, D.L. and K.C. Tan, *Visual Displays: The Highlighting Paradox.* Human Factors, 1989. **31**(1): p. 17-30.

Usable Security Revisited

Niels Mathiasen
Department of Computer Science, University of Aarhus
nielsm@daimi.au.dk

ABSTRACT
In 1999 Whitten and Tygar [5] did an evaluation of PGP[1]. To do so they came up with a definition for the term *usable security* and some particular properties of security for interface design. In the mean time a lot of effort has been put into ad hoc evaluation of security systems[2], both actual systems and prototypes. Very little effort has been put into further systematic considerations. This paper revisits the 1999 definition and selected properties.

Author Keywords
Usable Security, Activity Theory, Activity Walkthrough

ACM Classification Keywords
H5.2. Theory and Methods

In their 1999 article, Whitten and Tygar [5] claim that users cause most security errors in computer systems. Further they claim that standard user interface design techniques are not applicable on security systems. Their analysis and definition is based on what Bannon [1] describes as *human factors*. In this paper a broader basis, consisting of [1]'s perspective on human actors, Bannon and Bødker's [2] activity theory approach, and Bødker's [4] considerations on third wave HCI, are used for revisiting [5]'s 1999 definition on usable security.

THE INITIAL DEFINITION AND PROPERTIES

[5] defines usable security as:

> *Security software is usable if the people who are expected to use it: (1) Are reliably made aware of the security tasks they need to perform. (2) Are able to figure out how to successfully perform those tasks. (3) Don't make dangerous errors. (4) Are sufficiently comfortable with the interface to continue using it.* [5]

The paper mentions that users may have different perspectives on the systems they use and that security systems may be interacted with in different contexts. Some users may be interested in efficiency, others in learnability or flexibility. Nonetheless the paper takes on a systems perspective and defines what the system needs to assume of users and what users should expect from the system.

In a set of defined properties, which make security a particular difficult domain for interface design, [5] mentions *the unmotivated user property*, *the abstraction property* and *the lack of feedback property*. The first states that managing security when interacting with a system is not your primary task. The second states that most users are not capable of creating and managing security policies because security rules are too abstract. The third states that systems are not capable of knowing which security policy the user actually wants the system to enforce. This makes systems incapable of providing and evaluating feedback.

FROM HUMAN FACTORS TO HUMAN ACTORS

Bannon [1] advocates a shift in terminology and perspective from *human factors* to *human actors*. With the former perspective users have been seen as a set of components in a system. Components just like any other components. With the new perspective, users are actors, who have *motivation*, *goals*, *values* and *beliefs*. They can be part of, constrained by, and influenced by their membership of a community of workers.

Seeing users as naive or as idiots is according to [1] a consequence of reducing users to a set of components. [1] encourages us to see users as a resource to insight in the domain. It is system designers who are domain-naive.

OPERATIONALISATION AND MEDIATION

Bannon and Bødker [2] apply activity theory to HCI. Human users, are always participating in *activities*. Activities give meaning to *actions*. E.g., the activity of authenticating gives meaning to submitting your username and password. An action is realized through a series of *operations*. E.g., the action of submitting a password and a user name consists of the operations of pointing to the textbox, typing, and pressing a submit button etc. Users consciously think of the actions they conduct, while the operations, which these actions are realized by, are conducted without being conscious of every operation. When users perform the same series of actions over and over again these become transformed into operations. Likewise if the settings in which actions is conducted change, operations may be transformed into conscious actions again.

Inspired by Vygotsky, [2] introduces the term *mediation* to HCI. Human users *mediate* their activities through artifacts.

[1] PGP 5.0, which is an application for signing and encrypting e-mails.

[2] In this paper security systems is interpreted as systems or subsystem, which security or privacy issues is part of.

Artifacts could be language, tools, norms and more. Mediation comes with a new perspective on artifacts. Artifacts do not have meaning in isolation. Meaning is given to them through use. E.g., a digital signature is just a very long sequence of bits, but when used for signing it becomes a proof of identity.

EXPERIENCE IN A WORK/NON-WORK ENVIRONMENT

As [1] describes the first wave HCI and identifies the second wave HCI, Bødker [4] acknowledge the work done in the second wave and identifies the third wave. [4] states that the challenges of the third wave HCI should be concerned with emotions and experiences. She sees this as a result of a negation and discussion of the second wave HCI's focus on purposefulness and rationality and the third wave's focus on non-work and motivation. Bødker cites McCarthy and Wright for taking a pragmatic view on experience and emphasize their concept of felt-life. Where second wave HCI focused on workers in a work setting, the new focus is on non-work settings or the boundary between work and non-work settings. [4] states that focus on work/non-work should instead be elevated to a focus on life. Technologies like mobile phones are already used in both settings.

USABLE SECURITY REVISITED

To revisit the 1999 definition of usable security we have to take a different perspective. The perspective of actors, experiencing and mediating security artifacts during the use of security systems, should give a deeper insight into the security sensitive activities. Thus I propose that security systems should be considered usable when:

- The user's experience is consistent with the configuration of security policy. E.g. the user is confident if the system is secure and the user is suspicious if the system is in an insecure configuration.
- Actions, which do not lead to secure configuration of the security policy, should not be transformed into an operation. E.g. if a user is allowing public access to his personal information just by submitting the information.
- An action, which does not change the security policy conceptually, should be transformed into an operation through training or repeated use. E.g. when a user accepts to open a received file from trusted and known recipient.

The original properties of the security domain were based on a perspective that sees users as a set of components and tends to see users as naive. When revisiting these properties I propose that: (1) actors under influence of colleagues or public opinion may be motivated to do things right when they use a security system. (2) Users do have an understanding of security policies, so what is important is not whether they can understand concepts like a firewall or public/private-key. What is important is whether user's understanding can be enforced by the security mechanism the system offer. (3) Hence a system should be able to give a feedback precise enough for the user to determine whether or not their values and beliefs have been enforced.

FUTURE WORK

Future work will feature a theoretical approach, an inquiry approach and participation in an implementation of a new way to electronically sign and authenticate.

Through a series of interviews I will collect insights into how users of security systems anticipate and reflect on such systems. My corpus will consist of user stories and user reflections on how they want a future system to interact with them. Observation of real world activities should give an insight into how users behave when they are involved in security activities (E.g., signing).

Investigation will be carried out to get an insight into differences in electronic security activities and non-electronic security activities. For this investigation Bertelsen's [3] Activity Walkthrough will be used. It is expected that differences between electronic and non-electronic activities might relate to the context of the activities. The Activity Walkthrough is a lightweight evaluation method and takes context into account. The results are both applicable as guidelines in design and as a basis for theoretical discussions.

The goal is to refine the conceptual basis on usable security and apply this basis as proof-of-concept prototypes. Considerations regarding work, non-work and life settings are an important part of both the implementation effort as well as the theoretical refinement.

ACKNOWLEDGMENTS

I thank Susanne Bødker, Clemens Klokmose, Olav Bertelsen, Marianne Graves Petersen, Pär-Ola Zander and Ellen Christiansen for valuable input and discussion.

REFERENCES

1. Bannon L., (1986) From human factors to human actors: the role of psychology and human-computer interaction studies in system design, Design at work: cooperative design of computer systems, table of contents, Erlbaum, pp. 25-44
2. Bannon, L. & Bødker, S. Beyond the Interface, Encountering Artifacts in Use, in J. Carroll (ed.). Designing Interaction. Cambridge University Press 1991, pp. 227-253
3. Bertelsen, O. (2004) The activity walkthrough. Proc. of the 3rd NORDICHI, pp. 251-254
4. Bødker, S. 2006. When second wave HCI meets third wave challenges. Proc. of the 4th NORDICHI, pp. 1-8
5. Whitten, A., Tygar, J. D. Why Johnny Can't Encrypt: A Usability Evaluation of PGP 5.0. Proc of the 8th Usenix Security Symposium 1999

Personas - communication or process?

Lene Nielsen
Center for Applied ICT
Howitzvej 60
2000 Frederiksberg
+ 45 3815 33 58
Ln.caict@cbs.dk

ABSTRACT
Personas is viewed as a method for communicating user data to all members of the design team and customers, but maybe it should rather be viewed as a process method that ensures a user centered design process.

Categories and Subject Descriptors
H.5.m: Information interfaces and presentation (e.g., HCI), Miscellaneous

General Terms
Design.

Keywords
Personas, scenarios, user centered design.

1. INTRODUCTION
Personas are fictitious descriptions of users based on field data. Personas encourage a user-centered design process. When design solutions are discussed the persona is inserted into various scenarios that form the point of departure for design decisions. The design of the personas method varies. Cooper [1], with the introduction of the goal-directed method, emphasizes detailed user descriptions (precision), while Pruitt and Grudin [12] focus on accuracy through relations to field data.

The precise persona approach sees the advantages of the method as its ability to focus design and its ability to end discussions in its capacity of being a communication tool, [1], [2], [3]. The accurate approach [4], [11], [10] focuses on a strict relationship between data and what is communicated in the personas description. Focus areas in the descriptions are: computer skills, market size and influence, activities a typical day or week in the user's life, the persona's fears and aspirations. Added are strategic and tactical reflections. Both view the method as a communication tool for data.

2. COMMUNICATION OR PROCESS
The question of seeing a method as a communication tool implies a communication model of sender, message, media, and receiver [6]. In the personas method this can be seen in the attitude towards how the personas are created and communicated; someone translates the data into personas descriptions that are communicated to the design team via campaigns, e.g. slideshows, posters, emails, mugs [12] or as [11] puts it: "information about your complete personas is sent off into your organization". This sender receiver model obscures one of the biggest challenges in the personas methods: how to get buy-in for using the method from the whole organization. Rather than seeing the methods as a communication tool, it could be viewed as a process tool - a movement, or a designed sequence of changes, towards a user centered design involving all parties in the design process.

3. TEN STEPS – A PROCESS MODEL
From a practical and a research perspective I propose a model that views the personas method as a process. In the following I will go through the model from a process perspective.

3.1 Step 1: Finding the Users
The initial step is to get hold of as much knowledge of the users as possible. The data can originate from several sources: interviews, observations, second hand information, questionnaires, reports, cultural probes etc.

3.2 Step 2: Building a Hypothesis
Working with the personas method is focusing on users in a certain project context or domain and building a hypothesis of how the context might influence what constitutes a persona and the number of personas.

This is illustrated in the following example. A project for a national Danish authority concerning redesign of a web portal for business reports to different governmental authorities. The national authority had a tradition for dividing Danish businesses into categories of size and trades. When using the personas method this division of businesses did not make sense. The domain is not business size or trade, but reporting. What mattered is how big the company is – big companies have dedicated staff to do the reporting, small companies have staff where reporting is a minor part of their job. Another factor is whether the person who reports is employed within the company or is a consultant. [9].

3.3 Step 3: Verification

In the step 'Verification' the focus is on finding data that supports the initial patterns and at the same time supports the personas descriptions and the scenario writing e.g. what are the users values? What are their attitudes towards the system/site? The personas method is fundamentally a qualitative method and as such it requires several phases of looking at the result from both a partial and total perspective. In 'Verification' the partial result is tested to see if it obtains meaning in comparison with the overall result [5]. From a process perspective this test can be facilitated by involved members of the design project.

3.4 Step 4: Finding Patterns

Finding patterns is a categorization of the data into meaningful patterns that can support the personas descriptions. From a process perspective it is of importance to show the categorization to other team members, project partners etc.

In the above mentioned case we conducted a workshop with project partners and report suppliers in order to get their approval of the findings and patterns. This gave them not only an understanding of the underlying data and their comments to the interpretations, but provided also their support of the method.

3.5 Step 5: Constructing Personas

This step is not only a description of users, but includes an awareness of the final goal of the method; to create design solutions that takes the needs of the persona as starting point [7]. The fifth step might enhance buy-in. Pruitt and Adlin [11] address a "you" – the author of personas descriptions - in their book, when writing about this step. The personas method should rather be perceived as a collective process where everybody should understand how the descriptions came about and what they can be used for. If different team members are allowed to be part of the writing process they feel ownership of the personas. Afterwards the descriptions can be rewritten by a single person to ensure homogeneity in writing and presentation.

3.6 Step 6: Defining Situations

This step is a preparation for the scenarios. Here the situations in which the persona will use the system/site are described. Again it is a step where inclusion of partners can prove valuable for the process of adapting the method.

3.7 Step 7: Validation and Buy-in

To ensure that all participants agree on the descriptions and the situations two strategies can be followed. 1: ask everybody their opinion. 2: let them participate in the process. Having a process view helps create sessions where as many stakeholders as possible can be involved in the developing the personas and in using them for design.

3.8 Step 8: Dissemination of Knowledge

If the personas are not disseminated to participants they are not worth anything. It is not only the personas that needs to be distributes to everybody, but also the data - the foundation document [11], [4].

3.9 Step 9: Creating Scenarios

The personas method proves valuable when a persona enters a scenario. Teaching designers to think in persona-focused scenarios is part of the process. If they are not taught, the method might not be used by the individuals during the design phase where personas advocates are long gone.

3.10 Step 10: Ongoing Development

Lastly information on the personas should be updated [8]. It is crucial that not everybody is able to change the information, but knows whom to contact. I recommend having a personas ambassador who looks into the descriptions and who project participants can contact if they find irregularities in the descriptions. It is also the ambassador's duty to let the personas die when they have outlived their purpose [11].

4. CONCLUSION

This project model is a proposal. The insistence on a process view in the method seems to clear some of the problems reported in communicating the method to designers [8]. To refine the process and to test it further studies are needed.

5. REFERENCES

[1] Cooper, A. *The Inmates Are Running the Asylum*. SAMS, Indianapolis, 1999.

[2] Goodwin, K. *Perfecting your Personas.* www.cooper.com, 2001.

[3] Goodwin, K., *Getting from Research to Personas.* www.cooper.com, 2002.

[4] Grudin, J. and J. Pruitt. Personas, Participatory Design and Product Development. In *PDA 2002*, Malmoe, 2002.

[5] Kvale, S. *InterView*. Hans Reitzel, København, 1997.

[6] McQuail, D. *Audience Analysis*. Sage, London, 1997.

[7] Nielsen, L. *Engaging Personas and Narrative Scenarios*, PhD Series. Samfundslitteratur, Copenhagen, 2004.

[8] Nielsen, L. Then the picture comes in your mind of what you have seen on TV. In *The 5th DHCIR Symposium*, Copenhagen, 2005.

[9] Nielsen, L., E. Landbo, and A. Vorre Hansen. *Personas for Virk.dk - beskrivelser af personas, orbitter og deres tilknyttede data.* Snitker & Co, 2007.

[10] Olsen, G., *Making Personas More Powerful*. www.boxesandarrows.com, 2004.

[11] Pruitt, J. and T. Adlin. *The Persona Lifecycle*. The Morgan Kaufmann Series in Interactive Technologies. San Francisco, 2006.

[12] Pruitt, J. and J. Grudin, *Personas: Practice and Theory*. www.reserach.microsoft.com, 2003.

There is no “where” only “what” in user interfaces: lack of spatio-temporal dynamics undermines user interaction

Rune Nørager
MTI research unit
Department of Psychology
University of Aarhus, Denmark
+45 4041 4422
runen@psy.au.dk

Johan Trettvik
MTI research unit
Department of Psychology
University of Aarhus, Denmark
+45 8942 4936
johan@psy.au.dk

ABSTRACT
Humans identify objects by what they look like, i.e. their featural properties, and where they are located. The location of an object in time and space, also called its spatio-temporal properties, has been demonstrated to be crucial for human object identification. Whereas computers are extremely good at handling the featural properties of objects, such as files, folder menu items etc. and their associated attributes like color and shape, less attention has been paid to how to handle spatio-temporal properties. In this analysis we argue that there is little or no support for space in software languages and this lack of spatio-temporal information about objects´ location undermines user interaction at the GUI level. Here we provide an analysis of the problem and the measures needed to be taken in order to remedy the problem.

Keywords
GUI, space, software language, user interaction, cognitive functions, psychology

Background - The problem
Dynamic menus, resizable windows, shortcuts, tree maps and other 3D visualizations - what is the problem? These are all powerful aspects of how contemporary graphical user interfaces (GUIs) work. One problem is however, that they don’t really work since they do not activate basic cognitive resources that are highly powerful and massively resourceful - instead interaction is relegated to higher intellectual cognitive resources that are consciously effortful and have very limited capacity [1,2,3]. Common to all GUIs is namely their limited of compatibility with basic human cognitive capabilities, which leaves us only with our limited intellectual resources to use them [2]. The good news is however that we know enough of these basic cognitive mechanisms both to point out why the above applications fail but also on the flip side to provide specifications and help software GUI engineers to program superior interfaces that *are* compatible and *do* utilize the vast basic cognitive resources we have. It is not our intention to constrain or limit the design freedom and creativity of software engineers and GUI designers but to guide towards truly creative and superior software GUI solutions.

Background - The psychology
It is helpful to view the perception of the environment in two distinct classes. One is that of perception of objects, and the other is that of perception of space. Perception of the one is not the same as perception of the other, as is reflected in the seminal work of Milner & Goodale [1]. They present the two classes as systems are often referred to as the “what” versus “where” streams in the visual system. “What” makes it possible to name and consciously recognize objects by means of the objects´ featural properties like the colour, shape, texture etc. “Where” is linked to our sensory-motor action system and allows us to identify objects by means of their spatio-temporal properties, i.e. where they are at a given time. This “what” and “where” duality is dramatically demonstrated with brain damaged patients that suffer from blind-sight and cannot consciously see an object but can still catch it if thrown to them! Humans (and animals) thus rely heavily on both featural properties and spatio-temporal location properties when we interact with objects.

What and where in software
The logic of contemporary software programming languages does not support an adequate and precise notion of space and location which is reflected in GUIs that only truly supports object identification related to featural properties. Only in the most abstract sense related to the storage and management of files and folders can software systems uniquely denote a specific place such as [c:\documents\word\paper.doc]. This place typology bears more resemblance to semantic categorization than it does to objects in space and time. The problem from a HCI point of view was brought about with visual representations of user interfaces, such as the windows GUI metaphor, that suddenly activated true spatio-temporal perceptual capabilities on the user side but without fulfilling the demands of those capabilities. A file was no longer just a member of a folder structure but also had a position on a continuous layout on the screen. The same with menu items that are accessed with the mouse, whose position in the

drop list is suddenly very relevant to our localization rather than simply typing in memorized keyboard commands.

Bad software engineers?

The ordinary software programmers are not to blame. They are simply struggling with the problems inherent to the logic of the software code. To appreciate the problem we must realize that graphical interfaces are created in a medium, the software code, that is immaterial and therefore not constrained by the physical laws. This provides us with unlimited freedom to construct graphical user interfaces in any way that can be described in software code. Human cognitive skills are to different degrees however very rigid and dependent on certain regularities that reflect the physical world. This makes sense since the human brain has evolved to exploit the dynamics of the physical world. Other skills are more general and adaptable such as our ability to think abstract, solve problems, use symbols etc.

We are thus faced with the need to ensure that graphical user interfaces are compatible with basic constrained skills and this demands that we have the right support for such dynamics in the software code. Otherwise the interaction with such interfaces will have to draw on higher intellectual skills. This responsibility to remedy the problem could be placed de-centrally on every programmer but we might as well address the core problem – the logic and associated impetus of programming languages that guides the programmer to certain solutions.

Human navigation

Spatio-temporal dynamics are an intrinsic part of the space-time continuum that makes up the physical reality we live in. Organisms like humans have deployed a number of strategies to exploit the regularities of the space-time continuum. [4,5] So far four spatial orientation strategies have been investigated: 1) Geometric, 2) Path integration (vector summation), 3) Piloting (place learning via landmarks), 4) Spatial categories / templates. All four of these play a crucial role in our lives in the physical world despite modern cultural artifacts like GPS, maps, road signs etc. that refer to higher order cognitive skills [2]. Common to all four strategies are their dependence and reliance on specific physical constraints of two and three-dimensional spatial layouts. These constraints must also be adopted in GUIs and supported by software languages if basic human object identification is to be supported.

Although all four spatial skills are important the most obvious place to start is by implementing our knowledge of of orientation in relation to a static environment on 2D surfaces which is an almost one-to-one description of contemporary computer users that use a GUI desktop on a screen with a mouse and keyboard.

The constraints that govern such navigation situations are captured by Euclidian geometry where spatial relations between objects and space are limited to rotation, scaling and displacement. In other words these are the geometric transformations allowed in order to preserve the invariants of the spatial layout and objects inhabiting this layout. Euclidian geometry is very restrictive but it needs to be compared to a person that moves around in the physical 3D world. Such a person can identify objects and space based on more radical transformations based on topology while still perceiving the invariants or higher order information [7] despite radically different retinal images at any given point in time and space. This is just to say that if software programmers want to move into real functional 3D solutions cognitive perception psychology is also equipped to support this endeavor.

Discussion

Based on the preceding analysis we find that the following principle is paramount to address. *Just as objects like icons, text etc. does not change their appearance, unless intended to – like animated icons, so too should spatial-temporal properties not be changed unless intended to*. If we do not obey these constraints in GUIs and implement the necessary support in software languages the consequences are inferior user interfaces both functionally and hedonistically [8]. From a phenomenological perspective we might deem that featural properties are more important than spatio-temporal, but that is rally only and illusion. Spatio-temporal properties might be less predominant to out conscious experience but that simply bears witness to that we are dealing with extremely basic and powerful skills that support our activity effortlessly – if the world is compatible.

REFERENCES

1. Bærentsen, K.B. (2000). Intuitive user interfaces. *Scandinavian Journal of Information Systems*, 12, 29-60
2. Nørager, R. (2005). *Ecological Cognitive Ergonomics.* Department of Psychology, Aarhus University
3. Rasmussen, J. (1986). *Information processing and human-machine interaction: an approach to cognitive engineering.* (vol. 12) Amsterdam: Elsevier Science Publishing Co. Inc.
4. Gallistel, C.R. (1990). *The organization of learning.* USA: MIT Press
5. Newcombe, N.S. & Huttenlocher, J. (2003). *Making space.* MIT Press
6. Goodale, M. & Milner, D. (2006). One brain – two visual systems. *The Psychologist*, vol 19 #1
7. Gibson, J. J. (1986): *The senses considered as perceptual systems*. London: George Allen & Unwin Ltd
8. Nørager, R. 2006, "Users expect interfaces to behave like the physical world", i *Sixth Danish Human-*

Communication pattern and usability problem finding in cross-cultural thinking aloud usability testing

Qingxin Shi
Department of Informatics
Copenhagen Business School
Howitzvej 60, DK-2000 F
Qs.inf@cbs.dk

Torkil Clemmensen
Department of Informatics
Copenhagen Business School
Howitzvej 60, DK-2000 F
Tc.inf@cbs.dk

ABSTRACT
Communication plays an important role for the evaluator to find accurate usability problems in formative thinking aloud usability testing in the industrial area. This study tries to investigate the communication pattern of evaluators in the cross-cultural usability testing, and the influence on usability problem finding by doing experiments with Danish users and Chinese users. The purpose of this research is to propose an effective communication pattern for evaluators to do usability tests with western users or eastern users.

Keywords
Thinking Aloud Usability Test, Culture, Formative Evaluation, Communication, Usability Problem

INTRODUCTION
The thinking aloud usability testing method has been extensively applied in industry to evaluate a system's prototypes of different levels of fidelity [1]. It requires representative users to talk aloud while performing a task or solving a problem. The primary goal of a usability test is to find a list of usability problems from evaluator's observations and analysis of users' verbal and non-verbal behaviour. In order to extract accurate usability problems, the communication and interaction between the evaluator and user tend to be very important.

From Nisbett's culture theory [2], cognition and perception, such as causal attribution and categorization, are different between western people and eastern people. If the evaluator and user are from different cultures, they may be strongly influenced by their local cultural perspective, perception and cognition. Since usability testing is from the evaluator's eye to see the whole process, evaluators from different cultures may come up with different usability problems. So whether foreign evaluators could find the critical usability problems for the target users is worth to investigate.

In a cross-cultural usability test, users will behave differently when they are with foreign and local evaluators. From Hong's dynamic constructivist approach to culture [3], people's behaviour will be influenced by situational applicability, which means the appropriateness of a given cultural theory/knowledge depends on who the individual is together with. Sharing knowledge of usability problems and coordinating descriptions of usability problems depend on the mutual perception of group belongingness. When users are with the foreign evaluator, they may have some extra thoughts about whether it is appropriate to talk or not talk something with him/her, which make their communication different from those with local evaluators, and in turn influence the usability problems found by the evaluators.

Besides, the requirement of evaluator's cultural background is also related to the application or product which is tested in the target culture. We intend to use culturally localized application, since it may act as a primer to elicit user's cultural related communication or behaviour with the evaluator, which influences the evaluator's problem finding.

In this study, we want to investigate: how do foreign and local evaluators communicate with the user in order to find relevant usability problems in culturally localized application?

METHODS
We are going to do a series of experiments to investigate this question.

Experiment 1
We will do formative evaluation in order to see the evaluator-user interaction [4]. The goal of a formative evaluation is to identify user interaction problems so that they can be fixed in the next design iteration.

The first experiment will be done in Denmark with Danish users. We plan to do 16 tests with foreign evaluators and 16 tests with local evaluators. In order to avoid the sampling bias, we need more than 1 evaluator in each condition, which means 4 foreign evaluators and 4 local evaluators and each evaluator does 4 tests. We designed a "wedding invitation" application prototype using Clipart in Microsoft Word [5, 6]. We added a collection of wedding images and icons called "wedding clipart" to My Collections in Microsoft Word's clipart organizer. From the folder, the user supposedly could choose images and icons to add to their invitation letters. The task is to ask the users make a wedding invitation which they would like to use in their own wedding. It is divided into some sub-tasks, such as writing text, choosing images from, etc.

The independent variable is the evaluator's cultural background: foreign evaluator and local evaluator. Since this study is mainly based on Nisbett's culture theory, the foreign evaluators are the eastern people who are from Asian countries.

The intermediate variable is the communication patterns of local pairs and distance pairs (users with foreign evaluator).

In this study, we told the evaluators they could communicate with the user during the test as they usually do. We give such instruction since now how to do thinking aloud is not consistent to every usability practitioners. Whether evaluator can communicate with the user during the thinking aloud test is questionable for researchers [7]. But in the industrial area, most usability practitioners communicate with the user when doing usability test [8]. In order to make sure the evaluators do the test according to their normal way, it is better to tell them they could communicate if they think it is necessary for them to understand the user's speech and find usability problems

Quantitative content analysis will be used to analyze the communication. The video will be coded into some content categories, such as evaluator's behavior and user's behavior. In the thinking aloud usability test, evaluator's behavior could be coded as reminders, probing question behaviors, acknowledgement tokens [8], etc. Users' behavior could be coded as suggestions, positive comments, negative comments and culturally related comments etc [9]. All the content will be divided into some sub-categories. We will use Noldus to do the coding, and afterwards use SPSS to do statistic analysis to see whether there is significant difference between local pair and distance pair.

From the communication analysis, we can see in order to find relevant usability problems, what the communication patterns of local pairs and distance pairs are. Then we will analyze the usability problems they found to see whether there is any difference between foreign evaluators and local evaluators. Based on the communication analysis and usability problem analysis, we may propose an effective way for foreign evaluator to communicate with the user to find the relevant usability problems as the local evaluators do.

The dependent variable is the usability problem finding. We will calculate: 1) usability problem discovery; 2) Severity of the usability problems: minor, important and critical; 3) Shared usability problems found by local evaluator, or foreign evaluator; 4) Consistency of the usability problems found by evaluator and user.

A short questionnaire and interview will be conducted by the experimenter to get more information after the test.

Experiment 2

From Nisbett's cultural theory [10], users from different cultures may not be influenced to the same degree when they are with a foreign evaluator. Northern European culture is a typical task-focus culture, which implies users in those countries may not be influenced so much when the evaluator is from another country since they pay more attention to the task, not the evaluator. While East Asian culture is a socio-emotional relational orientation culture, users in these countries may be influenced more when they are with a foreign evaluator. So in experiment 2, we will examine whether foreign evaluator have the same influence on western users and eastern users.

The whole procedure is the same as experiment 1, but we will use Chinese users and Chinese wedding invitation application. From this experiment, we will not only examine the result in experiment 2 but also compare the result with experiment 1.

Experiment 3

Based on experiment 1 and 2, we will propose a more effective communication pattern for foreign evaluators and to see whether this communication pattern improve their performance.

CONCLUSION

From this research, we hope we can get a clear idea of the relation between communication pattern and usability problem finding for both local evaluator and foreign evaluator. Thinking aloud usability testing involves both evaluator and user, so how evaluator reads the user and communicates with the user effectively will influence their usability problem finding. From the local evaluator's communication pattern, we may get inspiration about how to change the foreign evaluator's communication pattern in order to find relevant usability problems for the culturally localized application.

REFERENCES

1. Law, E.L.-C. and E.T. Hvanneberg. *Analysis of Combinatorial User Effects in International Usability Tests*. in *CHI 2004*. 2004. Vienna, Austria.
2. Nisbett, R.E. *Cognition and Perception East and West*. in *28th International Congress of Psychology in Beijing*. 2004.
3. Hong, Y.-y. and L.M. Mallorie, *A dynamic constructivist approach to culture: Lessons learned from personality psychology.* Journal of Research in Personality, 2004. 38: p. 59–67.
4. West, R. and K.R. Lehman. *Automated Summative Usability Studies: An Empirical Evaluation*. in *CHI 2006 Proceedings*. 2006. Montréal, Québec, Canada.
5. Clemmensen, T. and S. Goyal, *Cross cultural usability testing.* Working paper, Copenhagen Business School, Department of Informatics, HCI research group, 2005. 2005-006: p. 20.
6. Sun, X. and Q. Shi. *Language issues in cross cultural usability testing: a pilot study in China*. in *HCI International 2007*. 2007. Beijing.
7. Ericsson, K.A. and H.A. Simon, *Protocol Analysis. Verbal reports as data*. A Bradford Book. 1993: Cambridge Massachusetts.
8. Boren, M.T. and J. Ramey, *Thinking aloud: Reconciling theory and practice.* IEEE Transactions on Professional Communication, 2000. 43(3): p. 261-278.
9. Vatrapu, R. and M.A. Pérez-Quiñones, *Culture and Usability Evaluation: The Effects of Culture in Structured Interviews.* Journal of Usability Studies, 2006, 2006. **1**(4): p. 156-170.
10. Sanchez-Burks, J., R.E. Nisbett, and O. Ybarra, *Cultural Styles, Relational Schemas and Prejudice Against Outgroups*. 2000, University of Michigan.

Evaluating Mobile, Ubiquitous and Context Sensitive Services in the Field

Kasper Løvborg Jensen
Multimedia Information and Signal Processing
Department of Electronic Systems
Aalborg University
klj@es.aau.dk

ABSTRACT
By utilizing the sensing and processing capabilities of today's mobile devices it is possible to capture rich quantitative data about the usage and context of mobile, ubiquitous and context sensitive services in the field. This paper discusses how the capture and analysis of this can be automated and put into a framework for conducting large scale field evaluations and presents an implemented prototype framework. Exploratory sequential data analysis (ESDA) is proposed as the foundation for creating novel automated analysis methods.

Keywords
Framework, methods, mobile, ubiquitous, context, evaluation, automated capture and analysis, usage patterns, context, ESDA.

1. INTRODUCTION
Whether to evaluate systems, applications and services (for simplicity they will all be referred as services in this paper) in the laboratory or in the field has been topic for much debate within the mobile HCI community. The issue at its core, as [9] puts it, is whether or not field experiments are worth the hassle. High experimental control and easy data collection are virtues of the laboratory, while quite the contrary is true for field experiments. The general belief is also that field experiments are more costly with regard to time and resources. The gain is realism when evaluating the services in their natural environment and context of use. This might not always be so much of a gain, as several studies including [9] have shown, but other studies like e.g. [10] show the opposite and that it is indeed worth the hassle.

Here it shall be postulated that for at least a specific class of services evaluation in the field may be a sensible solution. In the spirit of creating new words and thus adding to the already crowded and ambiguous vocabulary describing computing technologies, the term "mubicontive" is proposed for describing these services. Being a contraction of the already (vaguely) defined terms: mobile, ubiquitous and context sensitive. Although the definition of mubicontive and the corresponding services are no less fuzzy than the definitions they build on, they do stand out from other services from a user experience point of view

1.1 Mubicontive Services
They are systems, applications and services designed to be used anytime, anywhere – often while the user is on the move, and often as a secondary task to some primary activity done in parallel. The cognitive load in most usage situations is significantly higher than standard for desktop applications, and the user experience would be very sensitive to contextual parameters such as environmental (e.g. noise, lighting), social (e.g. presence of people) and network (e.g. available bandwidth) conditions. Being mobile and ubiquitous the interaction will often be awkward and limited (e.g. one handed input and limited screen space) and the situations are dynamic and even stressful.

It is hypothesized, that such services will gain a lot from being put out in the field for both formative and summative evaluations. Nevertheless, the hassle of doing so is not insignificant, and thus there is a grave need for new methods and tools for conducting field evaluations of mubicontive services in a more effective and efficient way.

The proposed approach which will be discussed in the rest of the paper, is to capture large amounts of quantitative data during field experiments and subsequently doing partially automated analysis of these data to achieve an understanding of the user experience of mubicontive services and to evaluate their usefulness.

2. METHODS
In a large survey of methods for automating usability evaluation in general, [6] defines the activity of doing such evaluations into three main parts which can be automated: capture, analysis and critique. The main idea is to fit the most effective and efficient subset of such methods into one coherent tool or framework, which can (at least partially) automate the resource consuming capture and analysis parts in field experiments.

2.1 Automatic capture
Several tools and frameworks have been created for automatically capturing data in field experiments with mubicontive services. ContextPhone [11] and MyExperience [4] epitomize the state-of-the-art. Larger companies such as Nokia have developed in-house tools which may be even more advanced than these, but they are not openly available and thus of virtually no use. The common ground for these frameworks is that they utilize the rich sensing and communication potential of SmartPhones and PDAs to capture data that holds evidence to the user experience. These data can roughly be categorized as relating to usage, context or user attitude (qualitative).

All three types of information has been captured with success in proof-of-concept studies, however there seems to be a lot fewer studies showing how the captured data is actually used to evaluate the usefulness and user experience of mobile systems and services. [1] and [2] are rare examples showing how context and usage data can be used to evaluate the impact of a mobile service and to recognize social patterns in daily user activity.

Three important questions are: What types of data to capture, when to capture it and how to use it afterwards? The "easy" and most used approach is to simply capture everything - all the time.

This leaves the researcher with a huge amount of post-experiment data to analyze which is a very time consuming activity; especially when it is not clear what to look for. For this reason many studies are never thoroughly analysed and valuable knowledge is lost. Automating the analysis to some degree might be a necessary step to take full advantage of these data.

2.2 Automated Analysis

ESDA (Exploratory Sequential Data Analysis) might provide the foundation for automating the analysis process. [3] presents ESDA in the most general form, but translating it to terms of evaluating mubicontive services is relatively easy, since observational data will almost always take the form of sequences of events, actions, interactions etc. Using ESDA on automatically captured data is about manipulating such sequences of events into meaningful patterns which reveal evidence of the user experience. In [3] it is suggested that there are eight types of basic operators which they call "the eight Cs": chunking, commenting, coding, connecting, comparing, constraining, converting and computing. They should be used interchangeably to manipulate the sequence into patterns. Which methods to use and when is the tricky part and in practise this is decided ad hoc by the analyst, hence the name exploratory. This process can be automated nonetheless.

In [5], existing methods and tools for extracting usability information from user interface events are surveyed, and interestingly the classes defined in [5] to a large degree coincides with the eight Cs from [3]. A special class of methods categorized in [5] is visualization, which is usually applied as a last step. Visualization is a way to draw on the human brain's ability to visually recognize patterns and trends.

The goal of the automated analysis is to find and present the right data to the researcher in a suitable way. The right data being that which hold evidence to the user experience

3. DIASNET MOBILE FIELD TRIAL

A prototype framework has been developed for evaluating DiasNet Mobile, a mobile diabetes management service (see [7] and [8] for details). The experiment was conducted over a three month period, where a single diabetic user was using in his everyday life. Figure 1 shows how the observational data flows form the user to the researcher. The (partially) automated analysis in this framework is based on ESDA principles.

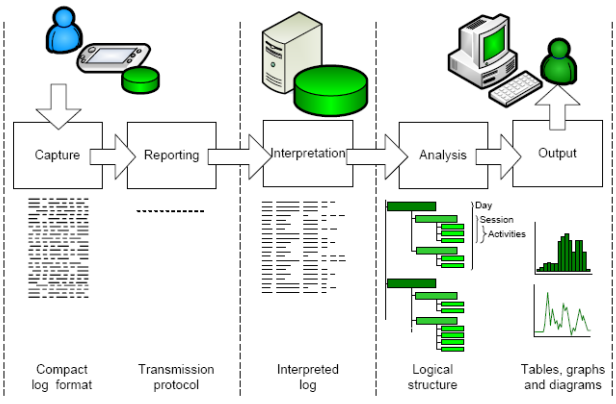


Figure 1: Automatic data capture and analysis framework from the DiasNet Mobile field trial [8]

4. DISCUSSION

The approach presented here is purely quantitatively oriented. The need for qualitative and subjective measures is fully recognized as being essential for uncovering the true user experience. The methods discussed in this paper are thought to be complimentary to such methods.

4.1 Conclusion

The tools and technology is available for conducting large scale field experiments. By using automatic capture rich data can be sampled with regard to usage and context. Studies such as [1], [2] and [8] give nice glimpses of what can be gained by mining such data from field studies. However, there is a significant lack of proven methods for exploiting these vast amounts of data in order to get insights into the user experience; specially how to include contextual data. Automatic methods using ESDA techniques are proposed as a road to explore.

5. REFERENCES

[1] A.Oulasvirta, R. Petit, M. Raento, and S. Tiita. Interpreting and acting on mobile awareness cues. *Human-computer Interaction*, 21:97–135, 2007.

[2] N. Eagle and A. Pentland. Reality mining: Sensing complex social systems. *Personal and Ubiquitous Computing*, 10(4), 2006.

[3] C. Fisher and P. Sanderson. Exploratory sequential data analysis: exploring continuous observational data. *interactions* 3, 2, 1996.

[4] J. Froehlich, M. Chen, S. Consolvo, B. Harrison, and J. Landay. Myexperience: A system for in situ tracing and capturing of user feedback on mobile phones. In *MobiSys*, 2007.

[5] D. M. Hilbert and D. F. Redmiles. Extracting usability information from user interface events. *ACM Comput. Surv.*, 32(4):384–421, 2000.

[6] M. Y. Ivory and M. A. Hearst. The state of the art in automating usability evaluation of user interfaces. *ACM Compututing Surveys*, 33(4):470–516, 2001.

[7] K. L. Jensen, C. F. Pedersen, and L. B. Larsen. Diasnet mobile: A personalized mobile diabetes management and advisory service. In *Second Workshop on Personalization for E-Health*, 2007.

[8] K. L. Jensen and L. B. Larsen, Evaluating the usefulness of mobile services based on captured usage data from longitudinal field trials. In *Mobility 2007.*

[9] J. Kjeldskov, M. B. Skov, B. Als and R. T. Høgh, Is it worth the hassle? Exploring the added value of evaluating the usability of context-aware mobile systems in the field. In *MobileHCI 2004.*

[10] C. M. Nielsen, M. Overgaard, M. B. Pedersen, J. Stage and S. Stenild, It's worth the hassle! The added value of evaluating the usability of mobile systems in the field. In *NordiCHI 2006.*

[11] M. Raento, A. Oulasvirta, R. Petit, and H. Toivonen. Contextphone - a prototyping platform for context-aware mobile applications. *IEEE Pervasive Computing*, 4(2)

Mainstream versus Mainstream: Two Approaches to User Interface History

Anker Helms Jørgensen
IT University of Copenhagen
DK-2300 Copenhagen S Denmark
anker@itu.dk

ABSTRACT
A trend has emerged in the last decade: researchers in media studies and cultural studies have taken an interest in the modern user interface. They address the cultural and media aspects of the interface and focus particularly on the influence of early visionaries such as Bush, Sutherland, Licklider, Engelbart, Nelson, and Kay. I've denoted this approach *mainstream* in User Interface History as it seems to expand and mature. This approach is an excellent supplement to traditional User Interface concerns in HCI and Interaction Design, but I find that it needs to be supplemented by what I call the *mundane* approach to User Interface History: mainstream development of mainstream user interfaces to mainstream software used in mainstream organisations. This working paper sketches these two approaches and presents a research framework for the mundane mainstream approach.

INTRODUCTION
The User Interface has gone through substantial changes in it's fairly short life: from knobs and dials on highly specialized equipment operated by highly trained specialists to elaborated interaction techniques on everyday devices used by ordinary citizens in mundane social activities. The computer and the interface have become deeply embedded in our culture. Not surprisingly, researchers in media studies and cultural studies have addressed the modern GUI and Web user interfaces [1,3,9,10,12,13]. They focus primarily on the influence of early visionaries such as Bush, Sutherland, Licklider, Engelbart, Nelson, and Kay.

It seems that this endavour is maturing and expanding as witnessed by a spout of recent publications from 2007 [1,9,12]. Hence I denote this endavour the *mainstream* approach to User Interface History. I also include the narratives on the graphical interface by historians and journalists in this mainstream approach [2,11].

The influence of the User Interface is starting to shine through in our language. To quote Pold and Hansen [12]: "Interfaces are becoming more widespread – mobile, connected, cheaper and embedded in everyday objects ... We live in an interface culture ..." (7) To me the term *computer* would apply here, but it seems that this swing towards perceiving the computer *as interface* has gained foothold. This was confirmed by my preliminary survey of what IT people know about the history of computers and user interfaces [6]. In addition, many IT-students seem to associate the interface exclusively with the *graphical* interface. Although the students' knowledge of User Interface and computer History was limited, the work at Xerox PARC was very well known - again supporting the media/cultural mainstream approach.

Contrasting this, senior HCI researchers' perceptions of User Interface History certainly include graphical interfaces, Engelbart, and Xerox PARC - but certainly also command languages, menu strutures in administrative systems, and the myriads of applications running on IBM 360 computers with 3270 character-driven displays [6]. (By the way, the IBM 360 was also a concept-computer that changed the computer business – just like the Alto and Star.) Hence my explorations of User Interface History [4,5] focus on a *mundane* approach: mainstream development of mainstream user interfaces to mainstream software used in mainstream organisations. An example of an issue is: What was the realm of a designer developing the user interface in an administrative system on an IBM 360 in the 1970s? This approach is not only in line with a current trend in historiography, namely to change focus from the "history of the kings" to the the "history of the peasants" but also in line with a central purpose of history: to avoid previous errors.

Contrasting the extensive interest in the User Interface by researchers from media studies and cultural studies, it is striking that so far hardly no computer historians have addressed the User Interface before the graphical interface – striking because numerous other aspects of computer and computing history have been addressed – and even for several decades.

My intention in focussing on the mundane is certainly not to downplay the importance of the above-mentioned visionaries. Historiography strives to paint a *complete* picture – and the work of the visionaries will stand out more clearly against the *mundane*. On this background this paper presents a research framework for the mundane mainstream approach. The object of study and its context are first outlined, followed by possible avenues for interpretations.

OBJECT OF STUDY AND ITS CONTEXT
At the *abstract* level, the core object of study is the *User Interface* in and of itself with its definition, genres, archetypes, etymology, terminology, and conceptualizations. It is embedded on a number of contexts: it is based on *technology*, forms part of *software* that constitutes *applications* used by *users* in *organisations* that operate in a *social* and *cultural* context. User Interfaces are developed

in *design processes* by *interface designers* that draw on a number of *sources* and *practices* in HCI and usability.

At the *concrete* level, examples of possible illustrative cases are (roughly in chronological order):

- Plugboard interfaces of the 1950s and 1960s
- JOSS: one of the first interactive, time sharing programming languages from 1963
- Portrait of a User Interface Designer of the 1960s
- The SABRE airline reservation system of the 1960s
- The character-driven 3270 display terminal and protocol on IBM 360 and 370 computers in the 1970s and 1980s
- Response time that was studied intensively in the 1970s and 1980s
- Studies of online versus batch programming by Sackman and others
- WordPerfect, a loved and hated menu-driven word processor in the 1980s
- User Interface Agents such as Microsoft's Bob and Paper Clip
- Invisibility and other perceptions of the User Interface
- Modalities: gestures, speeech, etc.

A number of *themes* can be considered such as

- etymology and terminology
- influences from pre-digital-computer input-output devices
- cult interfaces
- the interface going cultural
- visionaries versus mainstream
- the people and the trade of User Interface Design
- miniaturization
- users and their the role
- driving forces such as market, visionaries, users, research & development

These will serve to unfold selected aspects of the story. At a more general level, a number of *perspectives* can be recruited to explain the underlying mechanics:

- evolution/revolution
- emergence
- myths
- (user-driven) innovation
- dissemination
- science-technology-relations.

Finally, as to interpreting this objects of study, cases, themes, and perspectives, a range of *theories* can be drawn upon: social, cultural, media, technical, economical, political, and organisational.

EPILOGUE

This short paper addresses a wide and complex field that by no means can be readily approached. My intention is to build up a History of the User Interface by continuously addressing selected parts of the field through archive studies and oral history (interviews with pioneers) - as done already [4,5,6,7,8]. The paper serves partly to focus my approach and partly to communicate my ideas, thereby hoping to inspire other researchers to chip in.

REFERENCES

[1] Barnes, S.B. (2007): Alan Kay: Transforming the Computer Into a Communication Medium. Annals of the History of Computing, vol 29, no 2, 18-30.

[2] Hiltzik, M. (1999): Dealers of Lightening: Xerox PARC and the Dawn of the Computer Age. Harper Collins.

[3] Johnson, S. (1997). Interface Culture. How new technology transforms the way we create and communicate. New York: Basic Books.

[4] Jørgensen, A.H. and Udsen, L.E. (2005): From calculation to culture – A brief history of the computer as interface. In Jensen, K. B. (ed): Interface://Culture – the World Wide Web as a political resource and aesthetic form. Samfundslitteratur, 39-64.

[5] Jørgensen, A.H. (2006): Exploring the History of User Interfaces: The Myth of Xerox Parc and Other Oddities. Proc. 6th Danish HCI Research Symposium, Aarhus, Nov. 15, 2006, 29-30.

[6] Jørgensen, A.H. (2007a): What Do IT-People Know About the (Nordic) History of Computers and User Interfaces? A Preliminary Survey. Proc. 2nd Conference on Nordic Computing, Turku, Finland, Aug. 21-23, 2007, 21-25. Turku Centre for Computer Science.

[7] Jørgensen, A.H. (2007b): An Early Danish Computer Game: The case of Nim, Piet Hein, and Regnecentralen. Proc. 2nd Conference on Nordic Computing, Turku, Finland, Aug. 21-23, 2007, 15-19. Turku Centre for Computer Science.

[8] Jørgensen, A.H. (2007c): A User Interface Issue in 1956: Preserve the Keystrokes in Usable Form. Proc 7th Danish HCI Symposium, IT University of Copenhagen, Nov. 22, 2007.

[9] Manovich, L. (2007): Alan Kay's universal media machine. Northern Lights, vol. 5, 39-56.

[10] Mayer, P.A. (ed) (1999): Computer Media and Communication. Oxford University Press,

[11] Nyce, J.M. and Kahn, P. (eds) (1991): From Memex to Hypertext: Vannevar Bush and the Mind's Machine. Academic Press.

[12] Pold, S. and Hansen, L. K. (2007): Interface – Digital Kunst og Kultur [Interface - Digital Art and Culture]. Aarhus Universitetsforlag.

[13] Wardrip-Fruin, N. and Montfort, N. (eds) (2003): The New Media Reader. MIT Press.

Undo in dynamic and distributed user interfaces

Rasmus Berlin
Department of Computer Science,
University of Aarhus
E-mail: batluder@daimi.au.dk

Clemens Nylandsted Klokmose
Department of Computer Science,
University of Aarhus
E-mail: clemens@daimi.au.dk

ABSTRACT
In this paper we address the issue of undo in distributed user interfaces based on instrumental interaction. We discuss shortcomings of classical undo implementations, and sketch out a method for hierarchical undo in a tree structure where each node keeps track of its own history.

Author Keywords
Undo, Instrumental Interaction, Ubiquitous Computing, Distributed Interfaces

ACM Classification Keywords
H.5 Information interfaces and presentation

INTRODUCTION

Undo is a feature that is completely taken for granted in modern graphical user interfaces. But in its simplicity – undoing what has been done – lies a myriad of challenges and pitfalls. In HCI research undo has especially gotten attention in the design of CSCW systems, since undo becomes non-trivial when more than one user interacts with the system.
In this paper undo is addressed from the perspective of *ubiquitous interaction* – interaction in pervasive, ubiquitous, tangible, ambient computing – characterised by multiplicity, distribution, dynamism, and mobility. We have been working on developing a prototype based on the idea of interfaces and interaction not being bound and confined by specific devices e.g. the personal computer. We have especially been interested in bringing the notion of instrumental interaction, as introduced by Michel Beaudouin-Lafon [3] into the context of ubiquitous interaction – an idea first described by Klokmose in a paper at DHRS 2006 [5].

UBIQUITOUS INSTRUMENTAL INTERACTION IN BRIEF

Ubiquitous instrumental interaction (UII) as introduced in [5] is grounded in a critique of the application paradigm in relation to distributed interfaces. UII is based on the idea of working with dynamic collections of simple instruments, collections capable of being separated and moved between devices. Fundamental for the idea is a strive towards a decoupling between input devices, interaction instruments and domain objects – in the sense that instruments should not be bound to a specific filetype, which typically is the case in classical applications, but rather bound to certain properties of objects. E.g. a simple example could be a drawing tool capable of drawing on any 2D surface, given input devices capable of manipulating two dimensions. Likewise objects should not be bound to specific representations, but capable of being represented differently in different views and on different devices with various output capabilities. Furthermore instruments are not bound to specific representations but can act across different representations – e.g. a general move instrument capable of moving both characters and words in text, and graphical objects in an image.

UNDO IN THIS CONTEXT

While designing a prototype to test the concepts of instrumental interaction in a ubiquitous setting, we needed to implement the unavoidable undo function, which should, to fit the paradigm, be an instrument capable of undoing previous actions. Undo functionality obviously requires some kind of data about past actions. Hence we needed to figure out where and how to store this data in a system where the setup of devices and instruments at the user only can be assumed to be dynamic.
In a single user system, one can expect the user to be aware of his own actions. Undo implemented as *undo last action* will for this reason usually behave as expected. But in multi-user system, the assumption that a user will know what the global last action was, fails. Neither can you in UUI rely on having the same instruments, the same views or even the same devices available when performing undo as when you performed the original action. Many previously suggested schemes for undo fails in this case, as they rely on having access to the same command (and its inverse) at any given point in time – something which cannot be assumed in UUI.

UNDO HISTORICALLY

An early and very simple form of undo is the single-step undo [6], where the last performed action can be undone, but only a single step. A natural extension of this is the linear undo [4, 6], where all actions are stored in a history list, undo can move backwards and forwards in the history by means of undo and redo. The history can be either arbitrarily long or restricted in length, and usually performing a new action after undo, will cancel the possibility to redo to the state before the undo operation. One exception is the history tree [4], where undo history is kept in and navigated through a tree structure. Non-linear models for undo have been suggested for two main reasons. The first is to be able to undo an early made mistake, without having to perform all subsequent actions again. The second reason is in group work situations, where the user wants to undo her last action, without interfering with actions performed by other users [4].

The script model [2], the US & R model [7] and selective undo are examples of non-linear models for undo. Research in group undo has mainly focused on local vs. global undo, whether to undo the last action performed by the group or by the individual user. A local undo is then obtained by a non-linear model: Selecting the last action performed by the user, and performing undo on this action. Prakash and Knister [6] define regional undo, using the same technique as for local undo, but using a slightly more difficult selection criteria. The selection takes location into account when selecting the actions to undo.

UNDO AND INSTRUMENTAL INTERACTION

The script model, which is mentioned above, and all its derivatives require that the commands of the actions performed can be executed in any order. The structure of these commands should be such as to support rearranging while maintaining the same result, and skipping of commands to produce predictable results. But more critical for UUI, all used commands need to be available when the undo operations are issued. Hence all instruments used on a given object must be available to perform undo. The alternative implementation described in [4] uses objects for each command, these objects have a reverse operation called *undoit*. While this implementation is elegant it is not feasible for UII since assuming that the used instrument is available when issuing an undo operation is not possible.

Our approach

An XML-based hierarchical structure has been used to store the data in our implementation, since it suits the general paradigm of instrumental interaction well, and XML is generally widespread and easily manipulated through standard libraries. When performing undo actions on an XML tree, XML has the advantage that actions can be reduced to three types, namely the adding or removal of a node, and the manipulation of an attribute of a node. Each of these three manipulations can with fairly little effort be expressed compressed as delta-values, e.g. a pair of attribute key and previous value.

The approach we have settled on is to let each node in the tree hold its own history. This way undo information can be accessed independently of a given device/instrument configuration. Letting each node hold its own history makes it possible to undo past actions without undoing later actions, given these were on different parts of the document.

"... if the system does support an undo function and if its effects are readily visible, then the user can judge whether it performed the desired recovery and make further corrections if not." [1]

Letting the user point to what she wanted undone, would ensure that the effects were visible and give a more predictable result than global undo. Nevertheless, the hierarchical structure of XML ensures that users will be able to undo the latest action performed in a complex tree or subtree. As discussed in [1], local undo, a concept known from the selective undo model [6], has issues when a user is acting as a response to another user's actions. This usually occurs when the users are editing the same part of the document. By letting the user point to the area, where she wishes to perform the undo operation, thereby ensuring that changes done by undo are visible, and that only the selected objects are changed, the need for a distinction between local and global undo vanishes. Having the history of a node contained in the node itself makes it possible to define different undo instruments, and let the instruments act on the history in the same manner as other instruments act on the data of the node itself.

Comments on implementation

All manipulation of the XML tree is done through wrapper classes that not only manipulate the tree, but also add history to the elements. This way history-keeping is more or less invisible in the implementation of instruments. All history actions are time stamped, making it possible to undo e.g. the latest action performed in a subtree by traversing the tree. We made sure that to other users the change when performing an undo is seen like if it was a do. We found this to be the least confusing, as other users might not be aware that a undo operation was issued. When you see a change being made by a user on another device, an undo operation will call back the former state, regardless of whether an instrument or an undo operation was used to alter the shared state.

DISCUSSION

The approach described above is a very open framework, and allows you not only to implement other undo functions, using other models like e.g. the history tree [4] as described earlier, but also to let the user switch between different undo instruments of his own choosing. However the system does have an issue with granularity given the current implementation. Instruments can be more or less complicated, some involve changing just a single parameter, but other instruments might make many changes to the structure in one action. Undoing such an action, in our current implementation, would require more than one click with a simple undo instrument.

ACKNOWLEDGMENTS

We thank Niels Mathiasen for comments and corrections.

REFERENCES

1. Abowd, G. D. and Dix, A. J. (1992). Giving undo attention. Interact. Comput. 4, 3, 317-342.
2. Archer, J.E., Conway, R., Schneider, F.B. (1984), User Recovery and Reversal in Interactive Systems. ACM Trans. Program. Lang. Syst. 6, 1, 1-19
3. Beaudoin-Lafon, M., Instrumental Interaction. In *Proc. CHI 2000*
4. Berlage, T. (1994), A Selective Undo Mechanism for Graphical User Interfaces Based on Command Objects. In *Proc. CHI 1994*
5. Klokmose, C. N. (2006) An Instrumental Paradigm for Ubiquitous Interaction. DHRS 2006 (Aarhus, Denmark, November 15, 2006). DAIMI.
6. Prakash, A., Knister M.J., Undoing Actions in Collaborative Work. In *Proc. CSCW 1992*
7. Vitter, J.S. (1984), A New Framework for Redoing. IEEE Softw. 1, 4, 39-52

Telephones, CSCW and HCI: "smart phones" but a "black box" telephony system?

Lill Kristiansen
Dept. of Telematics, NTNU,
Mob: +47 97 72 72 27
email:lillk@item.ntnu.no

ABSTRACT

In this paper we argue that many studies of communication in hospitals view the telephony system as a "black box." We also offer some glimpses of some implementations we have done that opens up the design space.

General Terms: CSCW, mobile phones, context awareness.

1. Introduction

There are obvious reasons why design of *new telephony applications* has not been as much in focus as other ICT applications (such as tailored IM/awareness systems) in HCI and CSCW research. From a technical point of view the telephone system has been a relatively closed system requiring expertise knowledge in e.g. SS7, IN and/or proprietary programming languages in order to change features. Thus the average ICT expert did not have expertise on changing phone systems.

This is of course changing with SIP, JAIN, J2ME, web services interfaces such as Parlay X. (See more on www.pats.no)

With the new ICT convergence also the telephone system becomes part of a more general ICT infrastructure. However, still most of the new applications created for mobile phones within the HCI and CSCW communities are applications *not interacting with the telephony signaling* (i.e. not redesigning call setup procedures or plugging value added services into existing call setup procedures).

This paper will look specifically into the use of telephony inside a hospital. In particular we will look into several papers dealing with issues relating to context aware communication (and phone calls) in a hospital. For each of the papers analyzed we will show how the phone system is mostly regarded as a "black box".

2. Analysis of studies in CSCW

2.1 A framework from telephony

At the new Rikshospitalet in Oslo public GSM is allowed for use, and IP-based infrastructures for VoIP are also entering the hospitals. In order to discuss former work in ICT in relation to a telephony system we will use Figure 1. This figure is quite general and aimed at a public mobile system such as GSM and IMS. However, also a system for in-house deployment in a hospital may use this figure (or a simplified version). The general figure may be used for a more general mobility, and fit in with applications for home care workers as well.

The API on the endpoint(s) is typically a plain telephony interface. Applications utilizing *only* this interface are classified as of type S1). These applications may still be distributed (networked), but they will not be interacting further with the call setup or later call handling in the network.

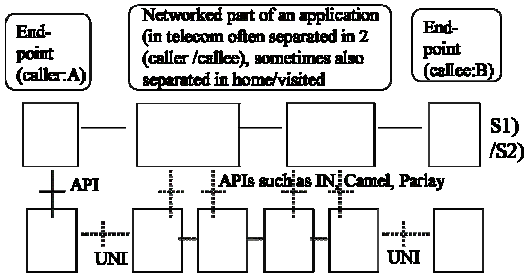


Figure 1 APIs in the endpoint and in the network (based on [5]) Dotted lines represent call/session related signaling (e.g. SIP)

The APIs in the middle of the network can be used to open up the phone system and add features to the call setup procedures as well as to do call transfer of an ongoing call. This is the typical telecom-centric approach. Services using the network APIs are classified as S2) (they may use endpoint API as well).

2.2 Studies from Mexico

Then Mexican research group have some studies of IM and roles not handling real time phone calls (There is no room here to list these references). In the paper [2] they have several scenarios utilizing small handheld devices and bigger screens, as well as location information. In this paper they touch upon 'calling'. Part of one of their scenarios goes as follows:

> *"(..) [Later on a public screen] While Dr. Garcia is analyzing the patient's medical condition, he notices on the map that a resident physician is nearby and calls her up to discuss with her this clinical case". (From [2])*

We will argue that here the phone system is considered a "black box". Some API to initiate a call is obviously used, but there is no further discussion of the call handling. Issues not discussed include: Is the call a multimedia call? What happens if the callee finds the time unsuitable to answer the call? Is the call redirected to the callee's handheld device or directed to a general phone number for this person that may support multiple point of presence for the telephony application?

2.3 The AwarePhone (Århus)

In studies from the Århus group [3] there is a lot of focus on social awareness, location, messaging etc. There is also some focus on an application called 'AwarePhone' [1], (this system is sometimes called InteractivePhone as well). Here we will analyze AwarePhone a bit more.

In [1] (figure 3, p. 198) they show the AWARE framework, and how it interfaces a messaging service. No API towards telephony

is shown, though the system allows the user to place calls. Our understanding of AwarePhone is that it is an application that use an API on the phone endpoint to initiate a plain GSM phone call. Thus it is classified as S1) according to 2.1.

There is no discussion about a possibility to add e.g. caller's location (room, department, ..) to the call setup to be shown to the callee. Priority is mentioned, mostly for messages, adding priority to the calls is not discussed. We conclude that it treats the telephony system as a "black-box."

We also find it useful to compare AwarePhone with a master thesis under our own supervision from 1999 [8]. Here the application is called ComPage. The caller can bypass the system by not looking up status prior to calling, but instead dialing a (known) phone number directly via the 'traditional button dialing UI'. We assume this is also possible in AwarePhone.

Thus in these two applications there is no networked based call screening carried out during the call setup phase. We are not arguing that such call screening is better then the proposed solutions. We are just pointing out that *to open up the design space and discuss the possibility* would be a useful exercise.

2.4 Tromsø pager/phone system research

In [7] a study the use of pagers and wireless phones in a hospital is described. They are discussing interrupts in particular. They describe how the pager may be disturbing when the doctor is on surgery. Orally they described to us a future scenario like the following: *During surgery, place the pager in a specific rack, and have the system detect and register this as 'in surgery'. When someone initiate a page to this number from an ordinary phone the following should happen: Caller receives a voice message back stating: 'Doctor <nn> is on surgery, if you hang on the line for 5 seconds after the beep, then the page will be sent. Hang up now if you do not want to interrupt during suregery ' beep'*

This is an example where this functionality must be implemented inside the phone system (which is also handling the pagers). Thus they do *not* see the phone system totally as a black-box. They are continuing this research. See more in [6].

3. Related work from ntnu, Trondheim

We will end this paper with some brief description of some work from ntnu, Trondheim going a bit further into the phone system.

The first implementation extends the ideas from the 'context-aware pager warning' described in 2.4. The idea is that conveying some status-info back to caller A during the call setup phase does not need to go via voice, but can use web instead (at least when calling from a PC with a softphone). If the callee's agent in the network decides that the call shall not go straight through to the callee, then a url is returned to the caller carrying useful information (e.g. status, activity or other info). If the caller then decides that the current call is more important that the current activity conveyed, then the caller can decide that the call shall proceed. Thus it allows a combination of automatic and human decisions. This is further described in [10].

The second implementation looks into call/session handover of an ongoing multimedia call because a bigger/better screen has become available. This is further discussed in [9]. Here networked based APIs are used.

Of course there are many CSCW and HCI issues not yet tested when using such applications in a hospital (or in home care)

We are currently evaluating a prototype from UiO [4] integrating status, messages and calls at Rikshospitalet, Oslo. The prototype is so far only stand-alone (focusing on HCI), but we intend to make a real networked version using SIP based on feedback.

4. Conclusion and further work

We have described several research groups that are looking into advanced use of ICT in a hospital setting. We have described how most of this work *assumes that the telephony system is a black-box-system not to be looked into and opened up.* We have also described several alternatives implemented by us where the telephony system is opened up.

We argue that by opening up the black-box of the phone system we *open up the design space*. In this way also solutions requiring changes in the phone system can be designed and tested.

REFERENCES

[1] Bardram, J. E. and Hansen, T. R., *The AWARE architecture: supporting context-mediated social awareness (..)*. In Proc. CSCW '04. ACM Press, New York, NY, pp 192-201.

[2] Favela, J., et al., *Integrating context-aware public displays into a mobile (..),* Information Technology in Biomedicine, IEEE Transactions on Vol. 8(3), 2004, pp 279 – 286 doi

[3] ihospital project www.ihospital.dk/

[4] Knudsen, P. *Bruk av mobile enheter for kommunikasjon på sykehus,* master thesis, ifi, UiO, Oslo, 2007

[5] Kristiansen, L., *An Open Service Architecture with Location Aware Calls and Services*, Proc.WOCN2004, ISSN:1811-3923, Muscat, Oman, June 2004 pp187-191 pdf-here ,

[6] nst project description, http://www.telemed.no/context-sensitive-systems-for-mobile-communication-in-hospitals.448930-77936.html

[7] Scholl, J., et al (2007), *Managing communication availability and interruptions:(..)* Pervasive 2007. Pervasive Computing, Volume 4480/2007, pp 234-250,

[8] Teepo, A.A., *Tilgjengelig, også når du er utilgjengelig* (In Norwegian) master thesis, ifi, UiO, Oslo,1999.

[9] Østhus, E.C. Osland, P-O., Kristiansen, L. *ENME: An ENriched MEdia application utilizing context (..)* , LNCSE series 2005;Vol. 3823 pp.316-326

[10] Østhus, E.C., Kristiansen, L. *A presence based multimedia call screening service.* In. ISBN 2-553-01401-5. Springer-Verlag 2005 pp. 21-25

Challenging the borders between East and West

Lene Nielsen
CAICT, CBS
Howitzvej 60
2000 Frederiksberg
+45 38153354
Ln.caict@cbs .dk

Steen Filskov Andersen
Snitker & Co
Bredgade 21B
1260 København K.
+ 45 7027 4283
sfa@snitker.com

ABSTRACT
According to both the psychologist Nisbett and the sociologist Hofstede there is a difference between Easterners and Westerners. It has been argued that differences in cultural background play a role in both interaction design and test, but it might be difficult to make a clear distinction between East and West. Performing tests in both UK and Singapore our case shows that there is no difference between test results in the two places. It can be argued that the platform (mobile phones) makes users uniform and that Singapore might be more Western than Eastern.

Categories and Subject Descriptors
H.5.m: Information interfaces and presentation (e.g., HCI), Miscellaneous

General Terms
Theory

Keywords
Cultural difference, mobile, HCI, usability methods.

1. INTRODUCTION
In recent years cultural aspects has come to play a significant role when discussion interface design and evaluation methods. In the following we will briefly present the works of Hofstede [1] and Nisbett [2].

The sociologist Hofstede is presented with a focus on the differences between the two partners in our study: Singapore and UK. He [1] describes a difference between Singaporeans and British. Singaporeans have a higher rate of power distance than the British, and a higher long term orientation, while the British have a higher rate of individualism, masculinity, and uncertainty avoidance.

The cognitive psychologist Nisbett [2] argues that there is a difference between how people perceive objects and situations related to the region from which they originate. Nisbett argues that Easterners (Chinese, Koreans, and Japanese) tend to think holistic, are more likely to attend to backgrounds, are more likely to expect change than Westerners, are more likely to group objects in thematic relations, and deal with contradictions finding truth in both sides. Westerners (Europeans and Americans) think analytic, are more likely to attend to objects, group according to taxonomies, and tend to reject one side of contradictions.

2. THE CASE
The case described was based on 1-on-1 think-aloud sessions attended by 24 respondents. The scope was to evaluate a user interface for a future mobile phone model relying on touch screen interaction. The main purpose of the test was to find out if the touch interaction met predefined usability targets.

The test sessions were performed in usability labs in London and Singapore. The respondents were recruited with an equal spread in gender, age etc. 50% of the respondents were to have experience with mobile touch screen devices. A number of respondents were recruited as left handed and some should have owned or own a mobile phone with a specific software platform.

Based on a simulation prototype the stimulus was executed on a standard PDA with a touch screen. The moderator could engage certain actions remotely via a Bluetooth keyboard paired to the prototype. All text and dialogue were in English. In Singapore the respondents all expressed that English was their preferred language for this type of situation. The same moderator performed the tests in both London and Singapore.

The question guide included two tests. 12 respondents in each location were given test 1 - a scenario with 24 tasks while other 12 respondents in each location were given test 2 – a scenario with 19 tasks. The two tests explored different areas of the user interface, the functions, and features in the phone.

During the session the respondents were introduced to the simulation and a short interview was performed. They were introduced to the think-aloud technique and given a few minutes to look on their own at the simulation. Then the tasks were read aloud one by one to the respondents, allowing them to solve the task in their own time. Finally the respondents were asked to rate and comment on their experiences with the device both on a scale by their own words.

3. ANALYSIS
The summaries of the two tests show very little difference in the kind of errors and the severity of errors the participants report. The two summaries show that task # 12 and 36 were the most difficult tasks for the users to complete in both locations. Task # 21 and 41 resolved in a lot of workarounds compared to the original usability targets while most tasks all in all were completed by the majority of the respondents according to the original usability targets.

Task/User	1	2	3	4	5	6	7	8	9	10	11	12	Fail %
1	P 1-3	P 1-3	P 1-3	P 1-3	P 4+	P 1-3	W 1-3	F	P 1-3	P 1-3	P 1-3	W 1-3	8%
2	P 1-3	F	P 1-3	F	P 1-3	P 4+	P 1-3	P 1-3	P 1-3	W 1-3	P 1-3	P 1-3	17%
3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 4+	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 4+	
4	P 1-3	F	P 1-3	W 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	8%
5	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
6	W 1-3	P 1-3	P 1-3	P 1-3	W 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
7	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
8	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	F	P 1-3	W 1-3	W 1-3	P 1-3	8%
9	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	W 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
10	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
11	P 1-3	P 1-3	P 1-3	W 1-3	P 1-3	P 1-3	P 1-3	W 1-3	P 1-3	P 1-3	P 1-3	P 4+	
12	P 1-3	F	W 1-3	W 1-3	P 1-3	F	W 1-3	F	W 1-3	F	W 1-3	W 1-3	33%
13	P 1-3	P 1-3	F	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	8%
14	P 1-3	P 1-3	P 1-3	P 1-3	n/a	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
15	P 1-3	P 1-3	P 1-3	P 1-3	n/a	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
16	P 1-3	P 1-3	P 1-3	P 1-3	n/a	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
17	P 1-3	P 1-3	P 1-3	P 1-3	n/a	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
18	P 1-3	P 1-3	P 1-3	P 1-3	n/a	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
19	P 1-3	P 1-3	P 1-3	P 1-3	n/a	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
20	P 1-3	P 1-3	W 1-3	P 1-3	n/a	P 1-3	P 1-3	P 4+	P 1-3	P 1-3	P 1-3	W 1-3	
21	n/a	P 1-3	W 1-3	W 1-3	n/a	W 1-3	W 1-3	P 1-3	W 1-3	P 1-3	P 1-3	W 1-3	
22	n/a	P 1-3	P 1-3	P 1-3	n/a	P 1-3	P 1-3	n/a	P 1-3	P 1-3	P 1-3	P 1-3	
23	n/a	n/a	P 1-3	P 1-3	n/a	P 1-3	P 1-3	n/a	P 1-3	P 1-3	P 1-3	P 1-3	
24	n/a	n/a	P 1-3	P 4+	n/a	P 1-3	P 1-3	n/a	P 1-3	P 1-3	F	F	25%

Figure 1. Summary test 1, UK

Task/User	1	2	3	4	5	6	7	8	9	10	11	12	Fail %
1	W 1-3	W 1-3	W 1-3	W 1-3	P 1-3	W 1-3	W 1-3	P 1-3	P 1-3	P 1-3	W 1-3	W 1-3	
2	P 1-3	P 4+	P 1-3	P 1-3	F	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	8%
3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
4	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
5	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
6	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	W 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
7	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	F	P 1-3	P 1-3	P 1-3	8%
8	P 1-3	P 1-3	P 1-3	F	W 4+	P 1-3	F	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	17%
9	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
10	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
11	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
12	W 1-3	P 1-3	W 1-3	F	W 4+	W 1-3	P 1-3	W 1-3	F	W 1-3	W 4+	P 1-3	17%
13	P 1-3	P 1-3	P 1-3	P 1-3	n/a	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
14	P 1-3	P 1-3	P 1-3	P 1-3	n/a	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
15	P 1-3	P 1-3	P 1-3	P 1-3	n/a	P 1-3	P 1-3	n/a	P 1-3	P 1-3	P 1-3	P 1-3	
16	P 1-3	P 1-3	P 1-3	P 1-3	n/a	P 1-3	P 1-3	n/a	P 1-3	P 1-3	P 1-3	P 1-3	
17	P 1-3	P 1-3	P 1-3	P 1-3	n/a	P 1-3	P 1-3	n/a	P 1-3	P 1-3	P 1-3	P 1-3	
18	P 1-3	P 1-3	P 1-3	P 1-3	n/a	P 1-3	P 1-3	n/a	P 1-3	P 1-3	P 1-3	P 1-3	
19	P 1-3	P 1-3	P 1-3	P 1-3	n/a	P 1-3	P 1-3	n/a	P 1-3	P 1-3	P 1-3	P 1-3	
20	P 1-3	F	P 1-3	W 1-3	n/a	F	P 1-3	n/a	P 1-3	W 4+	P 1-3	P 1-3	20%
21	P 1-3	P 1-3	W 1-3	W 1-3	n/a	W 1-3	P 1-3	n/a	W 1-3	W 1-3	W 1-3	P 1-3	
22	P 1-3	P 1-3	P 1-3	P 1-3	n/a	P 1-3	P 1-3	n/a	P 1-3	P 1-3	P4+	P 1-3	
23	P 1-3	P 1-3	P 1-3	P 1-3	n/a	P 1-3	P 1-3	n/a	P 1-3	P 1-3	P 1-3	P 1-3	
24	P 1-3	W 1-3	W 1-3	W 1-3	n/a	F	P 1-3	n/a	W 1-3	P 1-3	W 1-3	P 1-3	10%

Figure 2. Summary test 1, Singapore

Task/User	13	14	15	16	17	18	19	20	21	22	23	24	Fail %
25	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
26	P 1-3	W 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
27	P 1-3	P 1-3	P 4+	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 4+	P 1-3	P 4+	P 1-3	
28	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 4+	
29	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 4+	P 1-3	P 1-3	P 1-3	
30	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
31	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
32	P 1-3	P 1-3	F	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 4+	P 1-3	8%
33	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
34	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
35	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
36	F	P 1-3	P 1-3	F	F	F	F	P 1-3	P 1-3	F	P 1-3	P 1-3	50%
37	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	F	P 1-3	P 1-3	P 1-3	8%
38	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	F	8%
39	P 1-3	W 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	W 1-3	P 1-3	P 1-3	P 1-3	W 1-3	
40	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
41	W 1-3	W 1-3	W 4+	P 1-3	W 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	W 1-3	P 1-3	
42	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
43	P 1-3	F	P 1-3	P 1-3	P 1-3	F	P 1-3	F	P 4+	P 1-3	P 1-3	P 1-3	25%

Figure 3. Summary test 2, UK

Task/User	13	14	15	16	17	18	19	20	21	22	23	24	Fail %
25	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
26	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
27	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P4+	P 1-3	P 1-3	P 1-3	P 1-3	P4+	
28	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P4+	P 1-3	P 1-3	P 1-3	P4+	P 1-3	P 1-3	
29	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
30	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
31	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
32	P 1-3	P 1-3	F	F	F	F	P 1-3	P 1-3	P 1-3	P 1-3	F	P 1-3	33%
33	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
34	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
35	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
36	P 1-3	P 1-3	F	P 1-3	F	F	F	F	P 1-3	F	F	F	66%
37	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
38	P 1-3	P4+	P 1-3	P 1-3	P4+	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
39	P 1-3	P 1-3	F	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	W 1-3	W 1-3	W 1-3	8%
40	F	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	8%
41	P 1-3	W 1-3	W 1-3	P 1-3	P 1-3	W 1-3	P 1-3	P 1-3	P 1-3	W 1-3	P 1-3	P 1-3	
42	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	
43	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P 1-3	P4+	P 1-3	

Figure 4. Summary test 2, Singapore

The respondents in Singapore were in general more used to the advanced functions in mobile phones, but this did not affect the result of the tests.

The moderator did not notice any difference in the power relation between the respondent and the moderator and all respondents in both locations were eager to express their negative and positive perception of the prototype. A part of the sessions were used for gathering data on the respondents' own perception in regard to perceived effectiveness, intuitiveness, satisfaction, and accuracy. Even these results (not shown) do not show any significant difference between the two locations.

4. CONCLUSION

This study has a small sample of participants and only two test sessions are compared which makes it difficult to point to any conclusions without further studies. Still the expectation of differences between the participants in the two countries UK and Singapore was not fulfilled. Three explanations should be looked into. Firstly being a former UK colony Singapore might be influenced by western thoughts. Secondly the domain of mobile technology might not create differences in test results as the small screen does not leave space enough to observe the differences Nisbett mentions of focus on environment or objects. The usability test did not focus on power, masculinity or individualism, but the test moderator did not see any differences in the participants' behavior. Lastly the lack of difference might be explained with the fact that a mobile phone user interface is a new and different form of interaction between the users and the device. No previous experiences influence the user's perception and approach. If this is the case then a touch screen-based interface will even further eliminate any cultural differences between Easterners and Westerners.

Still this case leaves a question of where the borders between East and West are and a critical eye on the adoption of cultural theories into the HCI field without thinking of the domain or the borders for the culture.

5. REFERENCES

[1] Hofstede, G. *Culture's Consequence: Comparing Values, Behaviors, Institutions and Organizations across Nations.* Sage Publications, 1980

[2] Nisbett, R.E. *The Geography of Thought*. Nicholas Brealey Publishing, London, 2000

A Typology of Personalisation- & Customisation Services

Jannick Kirk Sørensen
PhD. student, Media Science / Interaction Design
ILKM, University of Southern Denmark
jannicks@litcul.sdu.dk
+45 27 12 54 88

Author Keywords
Personalisation, Customisation, Marketing, Public Service Media.

INTRODUCTION

In my PhD project I examine how European providers of Public Service Media (PSMs), (also known as Public Service Broadcasters) relate to the concepts of customisation and personalisation. When examining the field of personalisation services, I found a general inconsistency in the use of the term 'personalisation' and an overlap with the term 'customisation'. Academic texts from computer science and marketing use the terms differently. When marketing texts talk about customisation (e.g. of web pages) the user is passive, she receives a system generated presentation of products matching her user profile. When computer science texts use the term 'customisation', the user is active, e.g. configuring a service or application. When the term 'personalisation' is used, the differences are even more diverse. Also in praxis – in user interfaces – terms are applied inconsistently. This paper suggests a typology for customisation and personalisation services.

Origins of inconsistency

The two concepts have different origins. 'Customisation' has its roots in trade, originally signifying the personal relationship between the merchant and the customer, and the deed of knowing the customers' preferences. Etymologically, there is in the German language an affiliation between the word '*Kunde*' (customer) and '*kennen*' (to know) [2]. As such, the match between product and customer stands in the middle with the provider – the merchant – as the active part.

'Personalisation' refers, according to the Compact Oxford English Dictionary, both to creation processes – '*to design or produce something to meet someone's individual requirements*' and '*make something identifiable as belonging to a particular person*', but also to the emotional processes of causing an issue to become concerned with feelings. When the term personalisation is used, it is the human with its particularities and feelings that stands in the centre as the active part.

The locus of selection

The two words indicate differences in point of views: Is the user / customer conceived as active or passive? Who is selecting the content? These questions are not only relevant for different types of individualised communication, e.g. user application settings, user-profile web pages, recommender services, targeted marketing etc., but indeed it becomes relevant when looking at question of offering personalised PSM online activities and the remit 'to inform, educate and entertain'. Should PSMs in their personalisation / customisation services try to push certain contents of societal or cultural importance or should they not? The current web feature, implemented by many news websites of 'most viewed' or 'most read' stories could in this context be described as an un-personalised mainstream customisation, rather than 'the wisdom of the crowds'.

In all cases a conflict exists about the selection of content: Who should set the agenda for the selection: the publisher's / merchants' / educator's wish to 'convey a message to an audience' or the user's / consumer's / citizens' interests of seeking certain content? As a prototypical case study, PSM's are, as both agenda setting organisations and services of the citizens, in a particular situation, split between customisation - pushing segmented content to users - ('something from us') and personalisation - delivering desired individualised content to the users / – ('something for me'). The above conflict, I argue, gets however intensified when it is algorithms and not human editors that select the content, as in the case with personalisation and customisation services.

REDEFINING THE TERMS

Stepping one step back from the editorial challenges of PSM, I will redefine the terms personalisation and customisation more generally to shed light on the different positions. I propose to include all user-profile based applications and services, ranging from user-settings in an application to data mining recommender systems / customer relation management systems in the typology. I will suggest three parameters for a typology of personalisation and customisation services:

Parameter 1: Initiation / activity

I suggest the first parameter to be based on who is the active part: the human user or the provider. I suggest using

the term 'customisation' to signify an active provider (e.g. a human editor, friend or merchant or an automated user-profile based service) pushing individually tailored contents to a consumer, who then evaluate the offerings. Here the product or content stands in the middle. An example would be recommender services that push content to users.

I suggest the term 'personalisation' to signify an active user that e.g. configures application settings, interface layout or content filtering to mirror personal interests and preferences. Here it is the human user that is placed in the middle, being the active part.

The Lazy Man paradigm

Looking particularly at recommender services as a case of customisation services, it seems as if many engineering projects are motivated by what I should call the 'lazy man' paradigm. This paradigm is inspired by the economist Mill's concept of 'the economic man' – an ideal figure who only has his own wealth in mind [1]. The assumption behind the 'lazy man' seems to be that users strive spending as less cognitive power as possible when they search for media content. My assumption is, however, that this passive consumption style is only one kind of customised media usage, and that users in many cases want more insight and control of the customised or personalised recommender service.

Parameter 2: Insight and Transparency of Outcome

The second parameter concerns the transparency of the interaction: to which degree can the user predict the outcome of the interaction? For example, changing the desktop photo or ring tone is a highly transparent personalisation interaction. On the contrary, trying to correct or outsmart false assumptions of a customised recommender service is difficult, as reported about the TiVo PVR system [4].

The transparency of the interaction and the user's ability to predict the outcome is essential when determining the power relationship between the provider and the user. How is the user facilitated if she tries to alter the system settings? Can she correct the misconceptions of the recommender or look into the mechanics of it? How much control and freedom does the user have? One may argue that black box systems have a higher usability, but I suggest relating the measurement of usability to the user's tacit or conceptual knowledge of the system with his or her motivation of altering the system, and the opportunities for alterations as provided by the interaction designers. Another aspect of transparency is the providers' privacy policies: to which extent can the user monitor or control where and by whom his or her user profile data are used, either in an identifiable or anonymous form?

Parameter 3: Consequences

Interacting with personalised or customised systems may have, as with all interactive systems, different consequences, ranging from minor, immediate and correctable unexpected outcomes to fatal results. Customising or personalising media content is however not likely to cause any fatal consequences but may however steer the user's attention in a certain direction like a human editor would do. The privacy aspect of 'consequences' concerns to which extent the user's life is influenced by an eventual individual violation of privacy, or by general false assumptions about user needs, developed by the provider, e.g. through web data mining [3].

CONCLUSION

The three parameters above shape the use experience of using personalisation- and customisation services. The questions of activity and passivity, of transparency and opportunities for interacting and the consequences of doing so, determine the distinction between personalisation and customisation; the latter being driven by the provider's interests, personalisation driven by the user's interests. The distinction sheds light on an old problem of either pushing content to an audience or letting people find and choose content driven by their curiosity and desires. The advent of computer mediated customisation- and personalisation services and their application e.g. in the context of Public Service Media accentuate the basic conflict of interests.

ACKNOWLEDGMENTS

The PhD scholarship is funded by University of Southern Denmark, Institute for Literature, Culture and Media, with Bo Kampmann Walther as supervisor. Furthermore I thank Fachhochschule Potsdam for hospitality during my stay as visiting student, the Prix Europa organisation and the EBU for access to empirical data, Rajendranath Akalu, CICT, DTU for inspirational conversations.

REFERENCES

1. Mill, J.S. On the Definition of Political Economy; and on the Method of Investigation Proper to It. London and Westminster Review October 1836. in *Essays on Some Unsettled Questions of Political Economy, 2nd ed.*, Longmans, Green, Reader & Dyer, 1874, London 1836.
2. Schipper, F. The relevance of Horkheimer's view of the customer. *European Journal of Marketing*, *36* (1/2). 23 - 35.
3. Wel, L.v. and Royakkers, L. Ethical issues in web data mining. *Ethics and Information Technology*, *6* (2). 129 - 140.
4. Zaslow, J. If TiVo Thinks You Are Gay, Here's How to Set It Straight What You Buy Affects Recommendations On Amazon.com, Too; Why the Cartoons? *The Wall Street Journal*, New York, 2002.

ISBN: 8779975410