
Going More Public: Situated Display Design in a Care Setting through Co-realisation

Connor Graham

Dept of Information Systems
University of Melbourne
Parkville, Victoria 3010 Australia
cgraham@unimelb.edu.au

Keith Cheverst

Computing Department
Lancaster University
Lancaster, UK LA1 4WA
kc@comp.lancs.ac.uk

Mark Rouncefield

Computing Department
Lancaster University
Lancaster, UK LA1 4WA
m.rouncefield@lancs.ac.uk

Christian Kray

Computing Department
Lancaster University
Lancaster, UK LA1 4WA
kray@comp.lancs.ac.uk

Abstract

We describe findings from field work at a residential community care facility for ex-psychiatric hospital patients. The field work focused on distributed care-workers who looked after residents at the two sites forming the facility. We reflect on the process of co-realisation that verified our understanding of the setting and generated initial technology designs. This involved sharing scenarios descriptive of typical activity with care workers and presenting a demonstration of networked public display technology in use. We then illustrate how co-realisation both refined our understanding of care workers' work needs and informed us about how and where public display technology could be deployed. Finally, we present an initial design for a public display.

Keywords

Health Care, Participatory Design, Ubiquitous Computing/Smart Environments, User Studies

Project/problem statement

This research project investigated possible technology support for a community health care setting. The key problem confronting us was how to design meaningful, dependable technology to support staff 'work' in a setting where technical artifacts already had been deployed. Thus we were not only concerned with understanding and designing for interactions among

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Copyright © 2005 AIGA | The professional association for design.

Figure 1: The Design Process

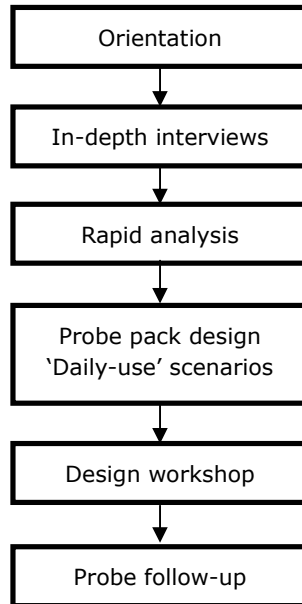
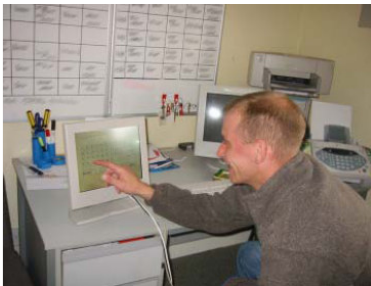


Figure 2: SPAM in use



staff that were work-related (e.g. exchanging information) and more “peripheral” [1] and lightweight in nature (such as the sharing of information for the purposes of resident therapy and relieving staff boredom) but also with how to configure and integrate any recommended technology with existing work practices through making a *particular* system work for a *particular* set of users, in a *particular* workplace at a *particular* time [2].

Background

The work involved a multidisciplinary team of computer scientists and social scientists. The main researchers were Keith Cheverst, Mark Rouncefield (Principal Investigators), Connor Graham and Christian Kray (Researchers). The participants were health care workers aged between 25 and 58, operating across two sites forming a community care facility in a small town in the north of England. One site is staffed all the time, even at night, whereas the other is staffed at regular working hours. This work was in the context of the Digital Care Experience of the EPSRC-funded Equator project and is being continued by the EPSRC funded CASIDE project. The latter project has the key aim of exploring the potential of situated displays to support community. We describe data collection and a design workshop which occurred between June and July 2004.

Challenge

The challenge of this project was to gain sufficient understanding of a setting that was particularly sensitive: the work of staff could easily be disrupted and changed through observation; and the work of staff was subject to particular legal and ethical constraints, such as confidentiality issues. Thus gaining proximity to staff interactions so that they could be understood

was exceptionally difficult. Additional challenges concerned the design and deployment of suitable technology that supported care-workers in resident care: staff had limited knowledge of technology; we had limited knowledge of residents’ psychiatric conditions; and neither we nor the staff could predict with any certainty how deployed technology might be used and adapted by staff for their own purposes, or “innofused” [3] and “domesticated” [4].

Solution

Process

The design process is shown in Figure 1. We appealed to field methods [5] and participatory design adopting an approach of co-realisation [2] which involved engaging participants actively in the design process as they, we felt, could advise us on the appropriateness of the designs we suggested. Thus we wanted to enable users to *realize* their needs through facilitation and create a context for design and development where “effort shifts fairly smoothly between implementing or adjusting previously decided possibilities, picking up on the host of small problems that arise during work, coping with the unanticipated consequences of previous actions, talking to individuals...” [6:155].

A previous phase of the research had investigated possible technology deployment through the use of informational probes [7] resulting in a number of technology solutions. The solution that was deployed was a messaging system, SPAM (SMS Public Asynchronous Messaging – Figure 2). This system allowed staff to communicate across the two sites by composing messages using an on-screen keyboard displayed on a touch sensitive screen. These messages were logged since SPAM’s deployment in October 2002.

Figure 3a: SPAM log extracts

Introduction: Setting life...

"mu 2 bol 0 cheeky"

"please ring [the] office sap. Thanksssss"

"Do you realise that all these messages are looked at Lancaster university?"

"im at the house talking to penny"

"did you hear the one about the 2 hungry sharks?"

"jane doe has been on the phone quite stressed asking for her medication...says she has been ringing since 6.15."

Figure 3b: 'Daily-use' scenario 2

Story 2: Forgetting something...

You have come to the end of your shift and walk out. As you are on your way out you realise you forgot to write something in your daily report. It wasn't urgent, but it was important for the resident's long term care plan. You make a mental note to write it in a report tomorrow.

- Is this a realistic story?
- Is the situation described frequent and/or critical?
- Does communication technology currently play a role in this kind of situation?
- Could communication technology help in this kind of situation?

Figure 3c: 'Daily-use' scenario 6

Story 6: Out of synch...

You are trying to organise a day trip to Blackpool for a few weeks' time. During your morning routine when you check on residents you notice that one seems really excited about the trip as she has been to Blackpool before and has some good memories of the place. This is the first time you've seen her as excited about something in a long time.

- Is this a realistic story?
- Is the situation described frequent and/or critical?
- Does communication technology currently play a role in this kind of situation?
- Could communication technology help in this kind of situation?

We felt this technology probe [8] data could assist co-realisation within the design process.

Orientation (Figure 1) aimed to understand the everyday practices of participants in the particular environment of the two sites and to establish if the theory chosen to inform data collection could promote that understanding. The theory selected was Strauss's [9] notion of trajectory, or "...a course of action..." that "embraces the interaction of multiple actors and contingencies that may be unanticipated and not entirely manageable" [9:53]. Orientation involved examining the SPAM log data (e.g. Figure 3a), interviewing researchers involved in prior research at the setting and visiting the two sites. This phase established that three sub-concepts of "trajectory" were important. One such sub-concept was the notion of phasing or "the researcher's conceptualization of phases, in accordance with changes in the interaction occurring over time "around" the phenomena as it evolves" [9:54]. This can include important stages, changes and transitions as well as regularly occurring rhythms of activity at a setting.

The *in-depth interviews* (Figure 1) involved interrogating 5 staff concerning their everyday WORK. We asked open-ended questions informed by particular trajectory sub-concepts such as *phasing*: "Does your work have particular stages during the day?" These interviews resulted in a series of notes (audio-recording was considered too intrusive) which we used to generate a series of stories resembling 'Daily-use' [10:180] scenarios. These provided examples of key trajectory sub-concepts found to be relevant to the setting. The scenario in Figure 3b, for example, shows that phasing was an aspect of staff's everyday work

and concentrated on the 'work' aspect of care work. Scenario 6 (Figure 3c), on the other hand, is more descriptive of therapeutic care work activity.

Rapid analysis (Figure 1) involved a collaborative examination of the data collected: the SPAM logs, field notes and photographs from site visits and interview notes. The current use of information in the environment was also considered (e.g. a pamphlet on healthy eating attached to a notice board – see Figure 4). The extracts from the SPAM logs that we chose (Figure 3a) and the scenarios that we evolved (Figure 3b and 3c) aimed to engender reflection among participants and verify our own analysis: we wanted to present snapshots of use that were evocative of usage situations and readily comprehensible, refutable and confirmable. We also wanted to engender further reflection though the design of a directed informational probe [7] pack issued to participants at the end of a design workshop. This approach aimed to explore message use (e.g. a note written on a PostIt) and how public, visual information (e.g. notices and pictures) was used at the setting. We wanted to understand the subtleties of information use in the environment, including the use of information to enable residents to help themselves, such as advice on healthy eating, as shown in the circled part of Figure 4. We also wanted participants to engage in the design of technology through this reflection.

The *design workshop* (Figure 1) involved multi-disciplinary teams of researchers and participants. Each group comprised one technologist, one HCI researcher and two staff members. This workshop had three stages: reflection on current practice; presentation of technology; and joint technology design. In Stage 1 we

Figure 4: A notice board at one site

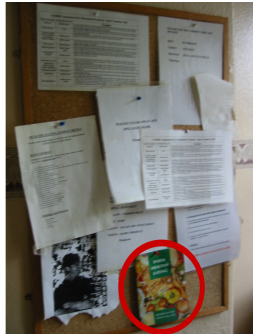


Figure 5: Technology presentation

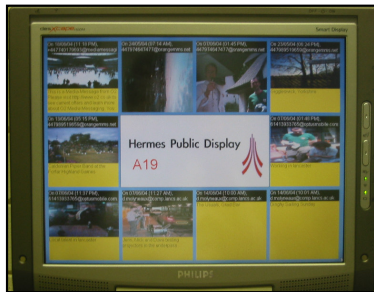


Figure 6: Design presentation



used extracts from the SPAM logs to assist with participants remembering situations of past technology use, such as for social interaction through the exchange of football scores (Figure 3a). We also discussed staff's current work through, using the scenarios as cues. Through this discussion we verified each of the six scenarios. Scenario 2 (Figure 3b), for example, was confirmed to be realistic, frequent and critical as the consequences of not recording or sharing information about residents could be very serious. Scenario 6 (Figure 3c) was also found to be realistic yet infrequent. It was also much more generative of discussion concerning possible client therapy through technology. Stage 2 involved discussing current uses of multimedia messaging and public displays. Specifically we described an everyday situation of possible future use involving the capture and sending of an MMS (Multimedia Message Service) message containing a photo and text via GPRS to a public display. This was based on a fully operational system operating at the University of Lancaster (Figure 5). Our aim here was to empower participants with enough knowledge to engage in the envisagement of meaningful technology design. Stage 3 involved groups drawing up sketches for a public display system and then describing and presenting these sketches (Figure 6). Thus there was a deliberate decision to constrain the envisagement of technology design.

Thus designs emerged through the design workshop stage. A further stage, the *probe follow-up* stage, aimed to 'flesh out' the proposed design further. This stage was effective for providing us with examples of the subtleties of the current use of messages (such as the use of notes to pass on telephone messages) and examples of the current use of public visual material in

the setting (such as for displaying important telephone numbers and resident artwork). It was extremely ineffective for providing us with any designs from participants. Only two participants returned probe materials and only one discussed the materials with us.

The process of evolving designs for the public display in this setting involved 6 discrete phases conducted over 6 weeks. The process was well-intentioned but expensive in terms of time and personnel. We confirmed our interpretations of participants' work through the design workshop and probe follow-up phases. Strengths of the approach were that we evaluated existing technologies through the analysis of the log data and the interviews, we involved participants actively in possible technology design, we adapted our methods to the sensitivity of the setting we also coupled study of current deployed and used technology with new technology development, seeking to understand how staff had domesticated and invented new uses for deployed technology and using that understanding in design. A possible problem with our approach was the lack of involvement of the residents themselves in design, although we accessed residents' experiences vicariously through the staff. Another problem was the choice of technology presented being potentially feasible and/or current at the time of the design workshop but infeasible or no longer in popular use at the planned time of deployment.

Solution details

Figure 7a shows a 'fleshed out' version of one of the designs that evolved from the *design workshop* stage and Figure 7b shows how it might work. The *design workshop* established that staff had key sets of needs: **informational needs** or needs supported by the

Figure 7a: Public display – overall view



Figure 7b: Public display – how it would work

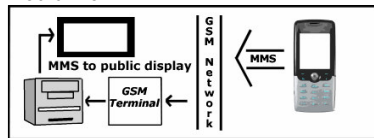


Figure 7c: Public display – touch sensitive screen interaction



Figure 7d: Public display 'active' area



exchange of messages; **broadcast needs** or needs supported by the visibility and public availability of information; and **therapeutic needs** or needs supported by the act of sharing itself. Each of these sets of needs related to the management of residents' care trajectories or how residents' psychological health could be maintained and even progressed through the collective action in the routine of care work and act of caring itself. Information needs, such as the need to have an accessible and current record of residents' medication, concerned the articulation and management of the collective action comprising the care work. Broadcast needs, such as the need to make staff information available to residents, and therapeutic needs, such as the need to share photographs to gain trust and confidence, are more concerned with the act of caring over the management of care. The challenge was to support these needs and the whole experience of care in the design.

We envisaged that staff and residents would interact with the public display suggested via a touch-sensitive display (Figure 7c) and devices supporting MMS via GPRS (Figure 7b) and Bluetooth. We also thought content could be proactively delivered to the display according to phasing: the display could react to particular key transitions such as a staff handover for example. We had concentrated our data collection on staff, but we aimed the final solution at both staff and residents due to the physical spaces at the setting being shared and the interdependence among staff and residents in care trajectory management. This had serious impact on *where* we thought the display could be deployed: a communal area for staff and residents seemed appropriate.

Figure 7a shows the staff currently on duty, provides some links to more information and other staff details and a sense of the position of the shift in the overall pattern of a day i.e. around 3 p.m. (indicated by the red square). This could act like a calendar through "next >" and "< prev": residents could view different staff shifts within a particular time frame. Figure 7c shows how other staff's details would appear if an icon representing another staff member was selected. Figure 7d shows how the display could support more therapeutic needs, in this case the promotion of healthy eating routines among residents. This part of the display could also be navigated and messaged to: residents could both view different health advice and details on different recipes and post messages and recipes. The bottom right of Figure 7a shows an area reserved for more 'active' content: digital photos to be shared. Here, we felt the physical act of sharing a photograph via Bluetooth or MMS, as well as making the result of that act publicly available through the display was important. We felt that the design should support residents and staff sending picture messages. In this way the physical act of sharing a photograph could be emulated. This functionality has already been implemented in a different context [11]. The need to have a filtering mechanism for these messages also emerged during the *design workshop* as inappropriate images could be sent to the display.

Results

At the time of the workshop we could only speculate on the technical feasibility of building a system that would support the process of sending a picture using Bluetooth. We now have some experience of this following the deployment and evaluation of a prototypical situated digital picture display on a

university campus [11], although we recognize that the domain context is different. The results of this work indicate that such a solution is technically feasible for users that have a level of experience sending pictures via Bluetooth. The need for a filtering mechanism also arose from the campus trial of the photo display.

The next phase of this project will involve building and deploying a prototype based on the campus version and the design ideas presented here. After approximately a two-month deployment period we plan to hold another workshop in order to discuss the design and how it might be improved and whether it is being using in the way that it was designed for or in other, unanticipated ways. We will also consider practical issues and theoretical issues. Is vandalism taking place? Are some members of the community of use being excluded, such as those without phones or the competence to send pictures? On a more theoretical level, we are keen to observe how notions of community apply to this particular setting and to contrast this with other deployments of situated displays we are privy to (e.g. the deployment of situated digital picture display to support a university climbing society) in order to evolve more transferable guidelines for how such situated displays can be deployed to support community.

References

- [1] Aune, M. (1996). 'The Computer in Everyday Life: Patterns of Domestication of a New Technology', in Lie, M and Sørensen, K. H. (eds) *Making Technologies Our Own? Domesticating Technology into Everyday Life*, Scandinavian University Press, Oslo.
- [2] Hartswood, M., Procter, R., Slack, R., Voß, A., Buscher, M., Rouncefield, M., and Rouchy, P. (2003) *Co-realisation: Towards a Principled Synthesis of Ethnomethodology and Participatory Design*. *Scandinavian Journal of Information Systems* 2002. Vol 14, No 2.
- [3] Fleck, J. (1988) *Innofusion or diffusion? The Nature of Technological Developments in Robotics*, ESRC Programme on Information and Communication Technologies (PIC), Working paper series, University of Edinburgh.
- [4] Silverstone, R., Hirsch, E. and Morely, D. 1991. Information and communication technologies and the moral economy of the household. In Sørensen, K. H. and Berg, A.-J. (eds): *Technology and Everyday Life. Trajectories and Transformations*. Report No. 5, Oslo: NAVF-NTNF-NORAS.
- [5] Schatzman, L. & Strauss, A. (1973) *Field Research: Strategies for a Natural Sociology*. New York: Prentice Hall
- [6] Buscher M., Mogensen P., and Shapiro D. (1996). *Bricolage as a Software Culture*. In *Proceedings of the COSTA4 Workshop on Software Cultures*, pp 9-30. Aalborg, Denmark: University of Aalborg.
- [7] Crabtree, A., Hemmings, T., Rodden, T., Cheverst, K., Clarke, K., Dewsbury, G., Hughes, J., Rouncefield, M., (2003). *Designing With Care: Adapting Cultural Probes to Inform Design in Sensitive Settings*. In *Proceedings of the 2004 Australasian Conference on Computer-Human Interaction (OZCHI2004)*, pp 4-13. Brisbane, Australia: Ergonomics Society of Australia.
- [8] Hutchinson, H., Mackay, W., Westerlund, B., Bederson, B.B, Druin, A., Plaisant, C., Beaudouin-Lafon, M., Conversy, S., Evans, H., Hansen, H., Roussel, N. and Eiderbäck, B. (2003). *Technology probes: Inspiring Design for and with Families*. In *Proceedings of the 2003 CHI Conference on Human Factors in Computing Systems (CHI03)*, pp 17-24. Florida: ACM Press.
- [9] Strauss, A. 1993. *Continual Permutations of Action*. New York: Aldine de Gruyter.
- [10] Cooper, A. (1999). *The Inmates are Running the Asylum*. Indianapolis, USA: Macmillan.
- [11] Cheverst, K. Dix, A. Fitton, D., Kray, C., Rouncefield, M., Sas, C., Salsis-Lagoudakis, G. and Sheridan, G. (2005) *Exploring Bluetooth based Mobile Phone Interaction with the Hermes Photo Display*. In *Proceedings of MobileHCI 2005*. To appear.

Acknowledgements

This work was funded by the EPSRC funded CASIDE project (grant ref: EP/C005589) and the Equator and DIRC IRC projects. The work also builds on work carried out under the EPSRC funded CASCO project and was part funded by a Melbourne University Abroad Travelling Scholarship (MATS). Thanks to Dan Fitton, Steve Howard, Frank Vetere, Sonja Pedell & Martin Gibbs for help, advice & photos.