Using an Intergenerational Communications System as a 'Light-weight' Technology Probe

Geoff Langdale
University of Sydney
School of IT
geoff@cs.usyd.edu.au

Judy Kay
University of Sydney
School of IT
judy@cs.usyd.edu.au

Bob Kummerfeld
University of Sydney
School of IT
judy@cs.usyd.edu.au

CHI 2006, April 22–27, 2006, Montréal, Québec, Canada.
ACM 1-59593-298-4/06/0004.

Abstract
A problem with the technology probe [1] approach is the substantial time required to gain results. For prototype technological systems, a further problem is the requirement that systems are deployed into non-technical end-user's homes, where they are comparatively hard to maintain. Even a robust system may be vulnerable to unavoidable problems in these kinds of environment (for example, bandwidth outages in a communications device). We introduce a light-weight procedure that sacrifices some of the realism associated with technology probes in favor of ease of deployment and speed of information gathering.

We apply our methods to the "Keep in Touch" (KiT) intergenerational communications system, and describe some preliminary results that we have obtained.

Keywords
Inter-generational communication, technology probes, cultural probes, agile methods

ACM Classification Keywords
H.5.2 User Interfaces, K.4.2 Social Issues

Introduction

Technology probes are a compelling new way to gather insights into users' lives, behavior and attitudes. However, using technology probes with new computing systems is difficult – it is often hard to deploy a prototype system into a users' home for substantial periods of time.

In this paper, we present a methodology for carrying out what we call 'light-weight technology probes', as well as a description of the system (the KiT intergenerational communications system) that we are evaluating with our light-weight technology probes.

These are not 'true' technology probes, as the artificiality and brevity of the trials does not allow us to get the insights into the user's actual lives; however, using our methodology in conjunction with our subjects' ability to imagine and extrapolate, we can gain many interesting insights in the same general domain as the one explored by technology probes.

Light-weight Technology Probe Methodology

Conventional Technology Probes

Technology probes are an extension of the cultural probe methodology first described in [2]. In [1], they are used to "gain an understanding of communication needs". While the use of a given technology in a technology probe can provide insights about usability, the focus of the technology probe is on insights into the users own needs, cultural norms and practices, not the technology itself.

Light-weight Technology Probes

Our approach attempts to capture some of the value of technology probes in a light-weight fashion. We outline the procedure for light-weight technology probes below: the steps described involve only a few days of elapsed time (most of this time being across Steps 1 through 3) and only a few hours of in-lab evaluation (Steps 4 through 6).

Step 1: The users are presented with a description of the existing system. This description may involve documentation of the system and/or live or recorded demonstrations of the system in action.

Step 2: The users are then asked to design some scenarios that are in keeping with their goals (in the case of the KiT system case, keeping in touch with family members) that they think that the system (as they understand it) could help with. This step is a low-level activity that the users are encouraged to think about off and on for several days as opposed to a high-pressure, 'real-time' assignment.

Step 3: The researchers receive the scenarios. At this stage substantial gaps between the users' conception of the system and the capabilities of the system may be revealed. How the researchers should respond to these gaps is not immediately clear. The system could be patched where possible to allow the users to succeed (unlikely to be practical in most cases), the users could be allowed to fail, or the users could be notified that the system is not capable of carrying out their scenario and encouraged to develop a different scenario.

Step 4: The users arrive on-site and attempt to successfully carry out their scenarios. Necessary

training for the use of the system is done with researchers present, but the researchers withdraw once the users have basic familiarity with the system. Unlike traditional usability testing, we are not seeking to gather statistically significant performance information on standardized tasks – that methodology, while advantageous for gathering usability data, is quite different from the goals of technology probes. After all, a set of scenarios devised by researchers or others will only add to the artificiality of the evaluation.

Step 5: The users are debriefed and asked to evaluate how well the system allowed them to fulfill the goals in their scenarios.

Comparison of Conventional and 'Light-weight' Technology Probe Approaches

The 'light-weight' technology probe represents a tradeoff between the realism of a true technology probe and the low overhead of an in-lab evaluation. Its advantages lie almost entirely with this low overhead – brevity and ease of deployment. The chief advantage of our approach is that the evaluation takes only a few hours, rather than days or weeks.

Another advantage of this approach is that prototypes that are not robust enough to work in users' homes can be used immediately. When evaluating 'in the laboratory' (of course, we are interested in avoiding an overly sterile, lab-like environment for our evaluations), the physical environment can be controlled. Network connectivity is reliable for the period of the experiment, and it is unlikely that hardware components break or wear out. Technicians can monitor the system throughout the trial and fix minor problems immediately. None of these properties is guaranteed to hold in a longer, in-home deployment. While robustness is a good quality for software, the bullet-proofing required for systems to work reliably in-home takes up a substantial amount of implementation effort.

A final advantage of our approach is that it creates a period of time where the users are completely engaged with the technology probe. In a fully realistic scenario, the users could spend arbitrarily small amounts of time using the prototype, and would only be motivated to do so by their curiosity and the perceived desirability of the prototype's functionality. Even in true technology probes, there must be a certain desire to help the researchers that is, to some extent, artificial.

Our light-weight approach has a number of disadvantages relative to true technology probes. The major disadvantage is the same as the major advantage of our approach – the brevity of the users' contact with the systems. Our approach depends on the users being able to project their future behavior based on brief acquaintance with the technology probe. It is important to remember that the insights that the users gain from this brief encounter are in a fundamentally different category from those that arise from a more long-term use of the system. However, this is not to say that these insights are valueless; capturing their 'first impressions' of a system can produce valuable insights.

Another substantial disadvantage of our approach is artificiality. The presence of experimenters through much of the process, as well as the prospect of being in a lab rather than a home, are factors that contribute to an artificial experience. Our contention is that most people are capable of becoming absorbed enough in the

communications scenarios that they have devised to at least partly ignore the artificiality of their circumstances.

The 'Keep in Touch' System

Goals

The 'Keep in Touch' audio messaging system (or KiT) is an inter-generational communications appliance. By 'inter-generational communications' we mean communications across a range of ages and abilities, including the very young and very old, the technically illiterate and the simply pre-literate.

KiT is an appliance, not a general-purpose computing device. Only features relevant to communication are included in KiT. KiT requires little administration; even this limited task is exported to a Web interface that is not used from the KiT appliances.

System Architecture

Our prototype KiT systems involve a small-form-factor PC and a touch screen (a production system would simply embed the PC into the screen; the small-form-factor PCs are advantageous for low cost and ease of development). A keyboard and mouse are not used.

Each node is given a name, and is a 'home node' for a set of users. This would correspond to the set of users who live in the house with that node. These systems automatically connect to a 'KiT server'. This server provides communications and configuration for the KiT systems, as well as hosting the Web-based KiT administration interface.

User Interface

The KiT user interface consists of two 'screens', the 'login screen' and the 'main screen'.

The 'login screen' is extremely simple: it shows the portraits of the users who have this node as their home node, as well as an indication for each user of how many messages are waiting for them. When the user selects her portrait, she is logged in immediately. We avoid user authentication to simplify the system. Instead, we opt for physical security, within-group social pressure and an expectation that the system is for casual, non-confidential messages.

Once the user logs in, she is presented with a 'main screen'. This consists of a top and bottom portion. The top portion consists of the portraits of all the people that the logged-in user is connected to. The bottom portion consists of a button that serves as a reminder of who is currently logged in and a chronologically-ordered list of the most recent messages currently in the system – these messages show the sender of the message.

Each of the portraits of connected users behaves in the same way. The most recent messages from a particular user are shown at the bottom of their portrait. Thus, messages may be represented in zero, one or two places on the screen. The semantics of interaction with either message indicator are identical.

In order to send a message using KiT, the user simply touches a portrait and can immediately start recording a message. The message indicators for that portrait disappear when the user begins recording a message and are replaced with a set of controls to send, cancel,

Detail of a KiT user portrait during message record. Message indicators on the portrait are replaced with recording controls when recording a message.

pause and preview the message in progress. These controls also show the system's state ('recording', 'previewing', or 'paused')

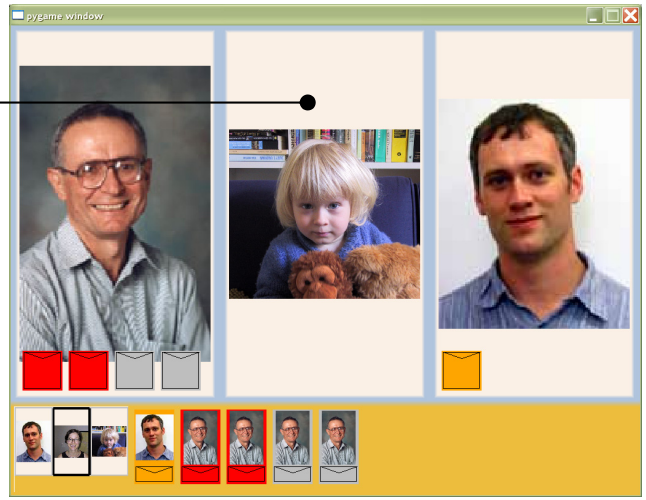

Figure 1: KiT Main Screen Window. System shows 5 messages waiting on screen, including 2 unread ones in red.

Administration

The KiT system does require administration. Our goal is not to reduce the amount of administration to zero – this is impossible. We choose to simplify administration tasks, remove the administration tasks from the normal interface of the system, and allow a technologically literate subset of the users to handle the administrative tasks required for the family group. The KiT server exports a Web interface that allows configuration of the system. The administration tasks are adding, moving and removing users, determining which users are 'connected', and setting up user portraits. These tasks can be done easily with a Web-based interface.

However, this interface is still complex compared to the interface on the KiT clients themselves.

Results

We have carried out two evaluations, each with groups of three users. The first evaluation involved a mother and her son at one location with the child's grandfather at the other; the second involved a grandfather at one location with a partner and grandchild at the other. Both children were young (2-3 years old).

The evaluations had mixed success (the adults were generally able to effectively use the system with almost no instruction, while neither child was capable of truly grasping the notion of the audio-based messaging). All adult participants responded positively to the system, citing the simplicity of their interactions with it as a positive factor. More importantly, the resulting discussions with our subjects were far-reaching and produced substantial quantities of design suggestions and personal revelations about the nature of the participants own experiences with intimate family communication and technology.

The users had interesting responses, including many that will inform future design decisions. These responses included:

- Substantial and personal disclosures about the nature of existing communications in the family groups (alienation from family members and bereavement were two of the more 'charged' issues that quickly came to light).

- Some elderly relatives of our subjects (often 3 generations removed from the youngest

subjects) were identified as being ideal users for this technology. The notion of a system that can be set up for an aging relative without the maintenance requirements of a PC was well-received.

- Most subjects claimed that there would be advantages for a messaging medium that is less rehearsed than e-mail and less intrusive than live telephone calls. Limitations on message length and on the ability to edit messages were recognized as lowering the level of commitment required to send a message.

- Unanimous support for the prospect of technologies to assist with scheduling message exchanges, live calls (in a future system) and to help with time zone calculations.

- A range of responses about where the system might be located within the subject's houses (front door, kitchen, living room) as well as suggestions for a moveable tablet style form factor. Resizing the device to the size of a PDA or cell phone was considered redundant with pre-existing devices.

Overall, the users were receptive to a lightweight, uncomplicated communications device and were able to produce substantial and interesting design ideas after brief acquaintance with the system.

Further Work

The current KiT prototype addresses only a subset of communications options. We plan to study a wide range of media richness and synchronicity options: adding the capability to make live calls, as well as video, text and photo sharing capabilities.

We are still evaluating our light-weight technology probe methodology. Our collaborators will be deploying the 'Keep in Touch' system as a conventional technology probe in 2006, so we will make a comparison of our approach relative to traditional technology probes.

Conclusions

The user studies described are a work in progress. From only these short evaluations, we cannot draw conclusions about the real utility of the system or the comparative merits of our 'lightweight' approach versus traditional technology probes. However, our results do indicate that the system we have outlined is appealing to users for intergenerational communication, and that users who are exposed briefly to the system are quite capable of providing design insights as well as insights into the intimate communications in our users' lives.

Acknowledgements

This research was funded by the Smart Internet Technology CRC Intelligent Environments Program.

Citations

[1] Browne, H., Bederson, B. B., Plaisant, C. and Druin, A. Designing an Interactive Message Board as a Technology Probe for Family Communication *HCIL Technical Report HCIL-2001-20* (2001)

[2] Gaver, B., Dunne, T., and Placenti, E. Cultural Probes. *Interactions 6 (1)*, ACM Press (1999), 21-29.