

# Text Messaging to the Home with TxtBoard

*Kenton O'Hara<sup>1</sup>, Richard Harper<sup>2</sup>, Axel Unger<sup>3</sup>, James Wilkes<sup>4</sup>, Bill Sharpe<sup>4</sup>, Marcel Jansen<sup>4</sup>*

<sup>1</sup> Hewlett-Packard Laboratories Filton Road Bristol, UK	<sup>2</sup> Microsoft Research 7 J J Thomson Ave Cambridge, UK	<sup>3</sup> IDEO Hochbrückenstrasse 6 80331 München Germany	<sup>4</sup> The Appliance Studio University Gate Park Row Bristol, UK
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## Abstract

This paper reports the design and user trial of a situated display, TxtBoard. This is a small appliance consisting of a touch sensitive screen connected via Bluetooth to an associated GSM phone module. TxtBoard displays SMS messages delivered from any standard mobile phone. Using examples of actual use, the study explores the ways in which particular communication episodes are shaped by the use of this situated display, and how this use indicates a need for communications that are peripheral, that are persistent and which support person-to-place connectivities. Implications for the future evolution of this and similar device are considered.

## 1 Introduction

The mobile industry has been constructed on a number of assumptions. The first holds that mobile communication, whether by voice, SMS or MMS, is universally better than fixed: it is, after all, not tied to place. The second is that the mobile phone itself is a personal device. Combined, these assumptions have resulted in the mobile phone industry emphasising the primacy of person-to-person communication. These assumptions have had an enormous and largely beneficial impact. They have enabled the industry to focus its marketing and technology implementation strategies to create the world-wide take-up of mobiles that we see now. Nevertheless, what we want to suggest that it might be an appropriate time to move beyond these assumptions in ways that will enable new forms of communication to emerge. These new forms need not be confined to person-to-person connectivity. They may include the potentially important role of situated messaging, for example, what one might call person-to-place messaging. They may include, too, one-to-many and many-to-one communications, public space-to-private space and vice versa and all possible variants in between.

Some of these potentially new forms have been manifest in the ways that users have been appropriating technology already. Consider the question of why fixed line telephony continues to play a role despite the ever-growing presence of mobile telephony. Fixed line phones continue to be used not simply because they are cheaper than mobiles: sometimes they are used because their fixed location and shared ownership afford certain types of communications practice. Take a hypothetical example: Grandma phoning her daughter's fixed line. Grandma might be doing so not simply as a method of summoning one of her offspring, but rather in an attempt to summons whom ever in her daughter's family might be home and available to talk: in other words, one of the grandchildren. The summons is, if you like, one to many rather than just one: it is to a household rather than to merely a place that is being called.

This is doubtless familiar to us all, albeit something we might not reflect on much. It is only made possible by virtue of the fact that a fixed (or landline) phone is shared by everyone who resides in the house and so, when one of the occupants answers the phone, even if it is for someone else, a level of serendipitous conversational interaction may take place. Ultimately one will be passed

over to the “correct” person. We all know that this type of unanticipated interaction with the “wrong” family members in the household can be of value, though just how great is unclear. Certainly, they can be the basis of shared gossip, and some believe that this is the very substance that binds social groups together (e.g. Dunbar, 1999).

Our point is not that fixed line telephony is better than mobile telephony or vice versa. Rather, through their respective properties, fixed line and mobile telephony afford different behaviours. Together they offer what we have started calling a different range of ‘contact’ and ‘response freedoms’ for how people choose to communicate; freedoms in the sense that each technology, bound as they are to distinct and sometimes overlapping ecologies, allow users to choose between different ways of expressing themselves. Through making explicit choices between different contact and response freedoms, subtle but important meanings can be conveyed and understood.

## **2 Background literature**

The above discussions, then, illustrate how fixed and mobile phones can offer a range of different affordances for communication; it is our view that this range can be expanded; though just how they may be, of course, an open question. One way of approaching this possibility is by looking at the situated display literature, a literature which is exploring just what it means to send and receive different types of information to different types devices and places (see O’Hara et al, 2003a for an overview).

Various authors have looked at the use of public displays to which information and messages can be sent via email, web-based interfaces or bespoke applications (e.g. Gruen et al; McCarthy et al, 2001; Churchill et al, 2003; Snowden and Grasso, 2002). For example, McCarthy et al, (2003) in their OutCast and GroupCast systems, explore the use of peripheral displays in personal and shared workspaces for displaying information relevant to the owners and users of these spaces. The aim was to provide location relevant information but also make information visible to encourage awareness and conversation. Digital notice boards such as the Apple Newspaper (Houde et al, 1998) and the Plasma poster (Churchill et al, 2003) have also been demonstrated to encourage community building by allowing people to post content (using email and web) relevant to users of the space in which the displays are located. Having the information visibly persistent in the environment encourages people to casually interact with things they would not otherwise seek out. Such information provided keys for conversation among the work colleagues within the vicinity of the display.

A further example of the situated display of information can be found in our own RoomWizard (O’Hara et al, 2003b). This system was designed to provide information about current room reservation such as who has booked the room at a particular time and the reason for the booking. A notable property about this system in use was the creativity used by people to label the “meeting host” and “meeting purpose” in order to be informative to the workgroup such that it facilitated awareness and coordination in the office place.

Curiously, there is very little research or technological development that leverages mobile content, such as SMS. The main exception is the recent work by Cheverst and his colleagues which has explored the concept in a couple of systems that have been deployed in the context of the workplace (Cheverst et al, 2003; Cheverst et al, 2004). The first of these is called Hermes, a system of office door displays. SMS messaging is one means by which short messages can be left on the display by the owner of the office or for the owner by work colleagues. This capability provides a lightweight means by which simple awareness and coordination information can be

persistently displayed so that they can be viewed at a glance by visitors or the office owner. In their discussion of the system, Cheverst et al raise some interesting questions about ownership and control of the displayed information due to potentially multiple messages from different parties competing for persistent display. In addition the work draws attention to tensions between the need to manage public and private boundaries on the one hand, and the interaction problems caused by requiring user authentication methods.

The second system, SPAM (Cheverst et al, 2004) is a public display for use by a particular workgroup in a psychiatric residential hostel. The system again provides a means by which members of the workgroup can send SMS messages to the public display. It helps individuals to inform the whole group about plans, activities, updates and whereabouts. Such information is seen as a valuable resource for awareness that facilitates coordination among the all work colleagues and handover of responsibilities to workers distributed across different work shifts. Sending such information to the public display means that it is available to all the workgroup rather than just individuals. What is notable was that initial concerns about potentially sensitive information turned out not to be a problem because of the high level of trust among the group and the feeling that any work related information is relevant not just to individuals but also the group as a whole.

### **3 Learning from the literature**

There are a number of key lessons that we can draw from these studies into situated displays. First, it makes it clear that location is crucial in determining the ways in which these technologies become appropriated into people's lives. Location determines the size and diversity of the potential audience. It determines the kinds of activities that people are likely to be doing there. This in turn clarifies the kind of content that gets posted.

Second, this research underlines the importance of how these display technologies fit within existing task and communication infrastructures. The literature demonstrates how usage changes when content delivery takes place via email (an everyday communication channel) rather than through web-based form (e.g. Churchill et al, 2003), for example.

It is in light of these key insights that we embarked on our research. First of all we decided to devise a situated display for a setting that had hitherto not been investigated a great deal from the situated display point of view, namely the home. Various ethnographic works in home settings have highlighted the importance of messaging and home-centric display artefacts in the management of everyday family life (e.g. Crabtree et al, 2003, Harper et al, 2004). Such work would suggest a potential role for the notorious "fridge display" concept but to date there has not been a successful demonstration of the concept either within the research field or commercial ventures such as the 3Com "Audrey". It seemed to us that one of the reasons for the failure of Audrey and related concepts is that they have been typically designed as "message centres" – portals through which messages are accessed – rather than as peripheral and situated displays. The latter approach emphasises such things as persistence and at-a-glance-ability and place rather than an emphasis on interaction and computational power.

Second, these technologies have not attended to the problem of leveraging existing infrastructures, seeking instead to create almost entirely new ones. Audrey for example required not only broadband before broadband was widespread, but also its rotating button metaphor for navigation begged questions about latency as regards movement between web sites where data packets might arrive in either a speedy or consistent manner. Thus, our own decision as regards the technological and social ecology we would leverage was intentionally opposite: if Audrey assumed too much,

we turned to the technologically uninteresting and, from a user experience point of view, simple ecology of SMS: the low data rate channel enabled by the GSM standard.

#### 4 TxtBoard

Thus it was that we developed TxtBoard, a fixed public display appliance to which SMS messages can be sent and displayed. The device consists of an 8 inch touch screen display that connects to a dedicated mobile phone via Bluetooth. Messages sent to the phone are then displayed on the larger display. As can be seen in figure 1 the interface real estate is devoted predominantly to the display of a message. Contextual information, such as the phone number and time the message was received, is also provided. Caller ID information is also associated with a name and image of the person stored in a database on the device so that when a message from a known phone is received a photograph can be displayed.

TxtBoard has been designed to give primacy to the latest message. Thus, when a new message comes in, it is automatically displayed. Until the message has been acknowledge as being read, the surrounding frame of the message will gently and repeatedly glow brighter and dimmer to alert people that a new message has arrived. Upon reading it, people can do one of two things by pressing the corresponding key on the touch screen: *save* or *erase*. It is also possible to scroll sequentially through the collection of saved messages one-by one.



Figure 1: TxtBoard display appliance

The interaction design has been kept deliberately minimal. The potential actions that can be performed at the device are few. The interaction hierarchy then is particularly shallow emphasising the display purpose of the device rather than interactive elements. This builds on design lessons learned in some of our previous situated display designs (e.g. O'Hara et al, 2003a; O'Hara et al 2003b).

For example, there is no message overview screen with which the user can view the contextual details (e.g. sender, time, date) of all the messages on the device in the same way you can do on pretty much any standard mobile phone. Perhaps more importantly, it does not include any facility that would allow people to respond to messages. Our reason for this is that it would have required the inclusion of an actual or virtual keyboard of some sort which would compromise the essential essence of persistent display of messages. There are other channels available through which it would be more appropriate to complete any communication loop.

Of course, these design decisions formed the basis of open questions as to whether more interactivity and some form of response capability on the device would be necessary in future design iterations. However, our aim was to start with this minimal design in order to see if there was value in the essential change in display form factor, persistence and location.

## 5 The Case Study

In order to further understand the impact of the TxtBoard, we installed the device in a family home. We conducted a number of interviews with various members of the family during a 2 month period and at the end of the trial. The interviews were based around their general perceptions of the TxtBoard and how it had come to be incorporated into their lives over the course of the two months. In addition, the interviews looked at specific instances of usage. This was based around the logs of messages that were sent to the TxtBoard during the trial. People were asked to comment on why they had sent particular messages to the TxtBoard and also asked to elaborate of notable linguistic features of the messages in terms of how they related to the affordances of the display. The aim here is not to provide a definitive documentation of TxtBoard use across “typical” families from a range of market segments (though such a study would certainly be of interest in the future). Rather, our aim is to demonstrate, through specific episodes of use, how the affordances of TxtBoard’s form factor shaped its role in the accomplishment of various everyday family matters.

The family consisted of the parents and two daughters. One daughter was a post graduate student, aged 21, while the other was 17 years old and in the final year of high school. Both parents and both daughters all have their own mobile phones and all of them have their own car. The father uses his mobile phone as a mixture of business and social. Much of his use is voice communication, using text relatively infrequently. When he does use SMS, he will do it not only from his phone but also the free SMS service on the PC. The mother in the family is a reluctant mobile phone user, having the phone primarily for emergencies. Much to the annoyance of the daughters her mobile is often switched off and so is not a particularly good channel for mother daughter communications. Her use of text messaging as a communication medium is even less frequent than the father’s. The eldest daughter is a frequent text user. She estimates 80% of her phone use is text based and largely for personal use. The reasons for this are based on a concern for not being intrusive, which given the nature of her social circle can be a potentially delicate matter. For the younger daughter, texting is also the predominant form of communication with her mobile phone sending anywhere between 10 and 20 text messages per day, mainly to friends. She will use voice occasionally but normally only when she needs an immediate response. While she is at school she is not supposed to have the phone switched on during lessons, a factor that can shape the ways others choose to communicate with her.

The TxtBoard was positioned by the family in a very public and visible part of the house, namely the hallway. The reasons for this, in the words of the father, were that the hallway was “*the epicentre of the traffic of our house because as you come in the front door it’s on the hall table.*”

*Everybody sees it when they walk in the front door. As you walk down the stairs you see it. It works for people coming in and going from one room to another.”*

During the period while TxtBoard was installed in the house, the family came to appropriate its particular properties in a number of interesting ways. While the frequency of usage was not especially high, approximately one message every couple of days, this should not be conflated with lack of value for the family. In the episodes we discuss, the family did find value in the device which allowed them to engage in certain types of communication episodes that would otherwise have been difficult without TxtBoard. In the following sections we discuss these communication episodes that illustrate its use in broadcasting calls for action; in keeping the whole family aware of activities to support coordination and provide reassurance; for simple acts of social “touch” and for reminding.

## **5.1 TxtBoard as a call for action**

Flight into Heathrow quarter to eight home about ten. Possibility of a lift? If you're asleep turn off mobile and don't lock me out axxx

The above message was sent by the eldest daughter and is an example of one of the most significant uses of the TxtBoard, namely to ask for some form of action or favour. When asked why she had sent this message to the TxtBoard the daughter replied:

*“The advantage of that is that you're getting the whole family all in one go...because it's a one to many and assuming that there's one out and three in, you've got a three times chance of in that example than in the other example, of getting a lift. The alternative would be for me to send three text messages hoping that one of the drivers would see it.”*

By virtue of its public display form factor, TxtBoard allowed messages to be broadcast to many people at once, increasing the chances that the request for action would be followed up. But what is the particularly important feature of these requests is not just that they are one-to-many but rather that they are “one-to-whomever might be there”. This is a subtle yet important distinction from the sender's point of view because the audience for the message is not something that the sender can know with certainty. What is notable about TxtBoard is how it allowed the sender, in the context of such uncertainty, to adopt a looser definition of who the intended audience was.

A second example message sent by the younger daughter extends these arguments about audience ambiguity to include criterion-based recipient definition.

I'm at Spoons. Won't be late don't lock me out thanks Vx

The message was sent from a late night bar, an unplanned extension to her evening out. In this message, we can see that the sender is again non-specific about for whom the message was intended and indeed this was unknown at the time of sending. The value for the sender of sending to the TxtBoard was that the message applied to whomever staying home that night might go to lock the door before she returned. Both the situatedness (being located in the family home and more specifically by the front door) and the public nature of the TxtBoard display afforded getting the information to the non-specific “*whom it may concern*”.

## 5.2 Informing, awareness and reassurance

As with other forms of mediated communication among family members, a good proportion of messages were for informing the rest of the family about current movements. Providing such information allowed other family members to make judgements about their own activities that may have depended on the activities of others, e.g.

Gone to get leki from bickley station V

In this episode, the younger daughter had gone to pick up her sister from the station while the mother and father were out but due to return home imminently. The daughter knew that the parents would be coming home shortly and that they would “*expect to see Vanessa*”. The daughter knew that had the parents come back they would have noticed that the “*car had gone from the driveway*” and that they consequently would have worried about her whereabouts. She “*didn’t want [them] to come home and think ‘my daughters have been kidnapped’*”. In sending the message not only did the information help alleviate the parents’ concerns but also makes explicit the daughter’s consideration and empathy. Such acts in themselves contribute an important role in the ongoing nurturing of family bonds.

Again, the situated nature of TxtBoard was important here because the information would only have been relevant to the parents if they returned home. Before having the TxtBoard, under such circumstances she indicated that she might have made a phone call to pass on such information, but only reluctantly. To tell them the information under contextual circumstances where it was not relevant was considered by her to be “over the top”. TxtBoard was more lightweight and regarded as a “*much more practical way of doing it where it doesn’t need a reply.*”

The provision of this type of awareness information was used very artfully by the family members to influence the actions of others. In contrast to explicit “calls for action” discussed in the previous section, the family members were very aware of how texting “whereabouts” information to TxtBoard could have secondary effects in prompting others to do things. This allowed them to make requests much more “politely” and indirectly. Consider this sent by the younger daughter:

I’m on a fast to Bromley coz i can’t be bothered to wait! i’ll get a bus from there Vx

When asked to explain the message the younger daughter retorted “*That was for anyone who could give me a lift, it was a hint, hint I’d quite like a lift.*”

By informing everyone in the household of her travel and arrival plans she was also inviting them to change the situation by offering her a lift. Part of the reason why TxtBoard supported this episode was simply the asynchronous nature of texting. A more important part, though, had to do with the inherent audience ambiguity afforded by TxtBoard. The interpretation of the hidden intent in the message was based on the intimate mutual understanding of the family members. She *knew* that her family *knew* that she was indirectly asking for a lift. But the indirectness of the communication act provided *plausible deniability* both in the request and also in the fact the recipients could have chosen to ignore it or pretended it wasn’t for them.

*“Yes because they can just ignore it, when I said I’d get the bus from Bromley, they could just ignore it and say OK she’ll get the bus, or they could say OK we’ll give her a lift, whereas if I’d rung up and said ‘I’m getting the bus’, they would have felt more pressured and say ‘OK we’ll come and pick you up’. It’s the same principle with texting to the person, you don’t have to engage in negotiations, you don’t have to go ‘oh I’m on the way home and I’m going to get the bus’ and dad going ‘what are you*

*saying, are you asking for a lift?', 'no, I'm not asking', 'well, are you asking or not, do you want a lift?', 'well yes that would be good'. You don't have to engage in that kind of awkward sort of, he feels pressured if he doesn't want to, he feels that he ought to kind of thing...I think it just leaves all of the negotiating to be done in his head or between him and my mother because if I'm just laying out you know 'this is what will happen'...It's the two scenarios, it's either that you will know I will be home at roughly 10 because I would have got a train and walked home from the station and I that I would arrive at home, or you can change that scenario by intervening to give me a lift."*

### **5.3 Social touch: from “small talk” to “small text”**

Other messages to the TxtBoard had content characteristics that were just informing the other household members of current activities for no particular reason other than to keep in touch. For example, in the following messages, while there is some element of reassurance in the content, other parts of the content do not serve any particular functional purpose. The messages are just a form of social grooming (Dunbar, 1999) and maintaining family bonds through the text equivalent of “small talk”

Easy drive no-ones up. Having coffee in kew. T & r.

Messages of this type are seen in standard one-to-one text messaging as a form of *social touch* and so are not necessarily unique to TxtBoard. Of note though is that such social touch messages still work within the public forum of the TxtBoard form factor, for groups as well as individuals.

### **5.4 Reminding**

Analysis of message content also demonstrated use of TxtBoard as a reminding device, e.g.

Going out to dinner with Alan and Ann hope your dinner goes well and Trinity form has gone off Dad and Mum

This message was aimed specifically at the younger daughter. The explicit choice to send the message to TxtBoard and not to her personal phone illustrates the sender's awareness of the properties of the medium in relation to this reminding function. The sender was exploiting the at-a-glance properties of the display and its location near the front door to ensure that the individual sent the form off before leaving the house.

### **5.5 Who sends messages to TxtBoard: Family or friends**

A significant feature of TxtBoard use was that only the family members who lived in the house sent messages to it. This was not just that other people were unaware of the device. Indeed the family had told several people about the device and numerous friends had actually seen it and thought it to be “cool”. The issue, here was that the household members did not envision TxtBoard in the context of friend-to-friend communication.

*“The advantage of that is that you're getting the whole family all in one go and I don't think any of my friends would prefer to use that than my phone...Not everybody sending text wouldn't want the rest of the world to see it, 'I've just split up with my boyfriend' or whatever, and they wouldn't necessarily want this splashed across the family home. I think it's more family, people who live together than friends because friends are one-to-one.”*

The concerns here point to a key issue for use of TxtBoard in terms of understanding the potential audience for appropriate recipient design of communication content. The public nature of the device makes the management of what is publicly disclosed in communication much more difficult for friends because there is inherently less precise control over who sees the message. For

many of the ways that the device came to be used (e.g. for coordination), friends and other people not actually living in the house would be unlikely to have sufficiently intimate knowledge of the potential audience and their routine comings and goings to support effective TxtBoard use. In this respect, *place*, and how it defined potential audience, was important in determining who actually would gain from the messages both as senders and recipients.

## 5.6 Responding to Messages

The inability to reply to messages directly from TxtBoard, in usage, did not turn out to be a real problem. Where a message did warrant a response, recipients resorted to other communication channels (e.g. their personal mobile phones) to complete the communications loop. For example, when the message - "I'm on a fast to Bromley coz i can't be bothered to wait! i'll get a bus from there Vx" - was received on the TxtBoard, the father used his phone to call the daughter to see whether she wanted a lift and what time she would be getting to the station. Resorting to phoning up to respond was actually an important feature of these types of messages to TxtBoard as there is a need for arrangements to be made. Texting to the display proved to be useful as a means of starting these negotiations but it was deemed necessary to switch to the voice channel to sort out the details of the arrangements (cf. Nardi et al, 2000) who characterised use of IM for "outeraction", namely the communication that takes place prior to an "interaction" to negotiate availability for interaction). The important point here is that TxtBoard, by existing as part of the broader family communication ecosystem, could retain an elegant simplicity to its design and avoid being overburdened with design features necessary for texting replies.

## 6 Conclusions

In conclusion, what we have seen in the episodes presented here are ways in TxtBoard came to be successfully used as part of the family's everyday communication patterns. The study highlighted new communication freedoms afforded by the fact that TxtBoard is situated in a particular place and by the fact that it is public and shared by all the family. It is not that TxtBoard created a new need for families to coordinate or maintain awareness of each others activities, or simply keep in touch. It is that it allowed these basic behavioural components of family life to be achieved in new and richer ways. TxtBoard defined a potential audience supporting one-to-many and one-to-whomever communications that were previously difficult to achieve with other communication mechanisms available to the family. Moreover, TxtBoard effortlessly compensated for dynamic shifts in audience makeup and relevance in ways that may be not so well afforded by other one-to-many technologies (e.g. caller groups or email distribution lists). This important versatility of the device at the social level arose out of the very simplicity of a design which emphasised such things as persistence, at-a-glance-ability and place rather than interactivity and computational power.

A further key reason for the successful integration was that TxtBoard extended an existing ecology of communication practices and infrastructures based around mobile telephony. Unlike some other attempts to introduce messaging displays into the home, TxtBoard was distinguished by its immersion within the lightweight anytime, anywhere, SMS communication infrastructure. While this was not particularly notable from a technical perspective, this study has demonstrated its importance from an everyday social perspective. This is consistent other public display technologies for which changing the mechanisms by which information is sent to them dramatically changes the type of content posted and how it is used (e.g. Churchill et al, 2003). This factor was also shown to be important from a design perspective. By considering the device as augmenting other communication channels in an ecology (e.g. using voice telephony to complete communication loops), it was possible to maintain a functional minimalism which did not compromise the design simplicity described above.

## 7 References

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