

Leveraging mundane technologies for group mobile social communication

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ABSTRACT

This paper outlines results from the long-term deployment of a system for mobile group socialization which utilizes a variety of mundane technologies to support cross-media notifications and messaging. We focus here on the results as they pertain to usage of mundane technologies, particularly the use of such technologies within the context of a cross-media system.

We introduce “Rhub”, our prototype, which was designed to support coordination, communication and sharing amongst informal social groups. We also describe and discuss the usage of the “console,” a text-based syntax to enable consistent use across text messaging, instant messaging, email and the web. The prototype has been in active use for over 18 months by over 170 participants, who have used it on an everyday basis for their own socializing requirements.

Categories and Subject Descriptors

H.5.2 [Information Interfaces and Presentation]: User Interfaces — evaluation/methodology, prototyping, user-centred design; H.5.3 [Group and Organization Interfaces]: Computer-supported cooperative work

General Terms

Design

Keywords

Cross-media, multimodal interaction

INTRODUCTION

A cross-media system is one that operates over a number of technological ‘channels’ or media. For example, in the system described in this paper, a message sent from one medium such as web browser might be delivered to a recipient in a different medium such as a mobile phone.

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The design of a cross-media system to support social interaction involves understanding peoples’ needs, wants, habits and contexts of use in order to create services that offer utility. At the same time, potential services must be considered in light of the technical possibilities for implementing those services across different media. People must be able to appropriate those services to meet their own evolving needs. And from a pragmatic perspective, a service must be provided across a range of technologies that people already own (or can be provided with) in order to test its use in everyday living.

Social interaction is characterised by its ad-hoc, opportunistic and unpredictable nature. While this is not necessarily true of all social interaction, we feel it is particularly the case for informal social interaction such as that between groups of friends. Modern day social interaction is also pervasive, crossing boundaries of time and space. Testing social technologies involves not only the user and the prototype, but may also require the participation of the potential user’s social groups. Experimenting with social technologies is thus best done outside of the usability laboratory, in the social context of typical interaction in everyday places. These properties all make designing and experimenting with social technologies difficult and unsuited to the isolation of laboratory settings. We believe that a true evaluation of a social system cannot be done outside of the social contexts of use. (For further discussion see [7]).

In exploring the design of a cross-media system to support social interaction within a community, we had to broach several issues: How would we characterise interactions in the community and how would we seek to better support interaction? What kinds of technologies did the community use and what might they be able to use? How could we evolve the service through revised versions or upgrades? How could we assist uptake by providing a service that was easy to learn? How could we support appropriation of the technology by users to meet their own evolving communication needs? Suchman [8] among others, points out that design does not finish, but that practitioners continually design as they adapt and develop their work practice with new devices.

The above questions suggested that an elegant design should be usable, learnable and evolvable across a variety of people in a social setting. This led us to undertake a form of user-centred interaction design coupled with a highly iterative development process, whereby iterations of the interface could be undertaken in response to user difficulties or requests and introduced to users in a matter of minutes, hours or days.

This position paper briefly outlines the prototype, however focuses mostly on a discussion of observations we have made

from the prototype's usage. Further details on the system are available elsewhere [4].

PROTOTYPE – 'RHUB'

Our prototype, 'Rhub', is a broad environment for experimenting with social software. Within it we have explored many aspects of group social communication, coordination and sharing and in this paper we focus on the cross-media interaction features which allow Rhub to be accessed from a variety of media. We use the term 'media' or 'medium' to denote the channel for interaction with the system. By adding enhanced functionality to familiar technologies, we hope to leverage existing knowledge, infrastructure and usage norms to reduce the asperity associated with new technology adoption.

We also followed a "release early, release often" development mantra and allowed the design of the system to develop according to observations and user feedback. Because of its long deployment, we also hoped that the novelty aspect of the system would diminish and complex, rich behaviours will emerge as the participants integrate the technology into their social group over time.

The prototype system consists of a web site, database and a series of services that allow Rhub to be used from different systems, such as text messaging (SMS), multimedia messaging (MMS), email and instant messaging (IM). These services are bidirectional¹, meaning Rhub makes use of these services to contact people as well as for accepting commands. It is beyond the scope of this short paper to discuss the functionality of the prototype in depth, so we'll focus on the most used feature, group messaging. Rhub also provides presence awareness, photo sharing, discussions, web feed aggregation and other common social software features such as tagging, profiles and so on.

Group messaging allows users to carry out a group conversation using a variety of technologies. Rhub forwards messages to group members individually, using a series of heuristics to determine the 'best' channel to use. Users can reply using whichever channel they choose – for example they might receive a message using instant messaging, but reply later using SMS as they walk to the bus. All messages (and other functions) are available using the website, which provides an even level of message persistency, regardless of source medium.

To support use by the text-based alternative mediums such as SMS, Rhub has a command-line interface we call the 'console'. The console exposes commonly used functions, and the syntax of commands is the same across all media. Console commands use a basic grammar designed to aid remembrance, consistency and intuitiveness (see Table 1 for examples). Major families of commands use a symbol prefix chosen to be indicative of the family, for example presence and location commands use the '@' symbol (commonly read as 'at'). Commands are produced by combining the symbol with identifiers or keywords and freeform text. For example, to set your current location you can send @home, or to find out who's at the cinema, @cinema? The small set of consistent symbols helps the user work out the syntax: 'I want to message someone, so I know it should at least start with an ">" as well as the system: if it cannot parse a command

starting with '>', provide help on common messaging commands. These symbols can also be recomposed, for example to send a message to a group the send-to symbol > as well as the group symbol & are used, such as: >&hacky: Hacky-sack anyone?.

Table 1. Example Rhub console commands

Prefix	Metaphor	Command	Example
>	Send to	Messaging	>Johan: Hello! <i>Sends 'Hello!' to Johan</i>
@	At	Presence and locations	@cafe? <i>Finds people at the café or nearby</i>
!	Command	Manipulating settings, or other tasks	!info Carsten <i>Returns Carsten's contact information</i>
&	And	Group related	&cricket add Lisa <i>Adds Lisa to the 'cricket' group</i>

RELATED WORK

There is other academic work that integrates mundane technologies to support enhanced group communication, such as TXTmob [5], Swarm [2] and Slam [1]. Rhub is different in that it integrates a greater variety of mundane technologies and was deployed for a long period of time with a large number of users. Commercial systems, such as Dodgeball (<http://dodgeball.com>), Twitter (<http://twitter.com>) and Jaiku (<http://jaiku.com>) are also similar, however are relatively opaque from an outside researcher's perspective.

STUDY

We used a multi-method approach to analyse the system's usage and participants observations. Qualitative data was gathered from in-depth, in-situ interviews with 15 participants, a design workshop with four participants and a probe-like quiz which gathered 102 responses. Quantitative data was extracted from logged usage data of over 170 participants and 500 group message contents were categorised.

Usage of the prototype was by invitation only, with the initial participants invited from our own social groups. These people soon invited their own friends, and so on, and the participant pool rose as a result. One major community of users were from a university sporting club which the first author is an active member of. This club established several groups in Rhub, the most prominent being 'Alpha' (all names changed for anonymity) which was a general group for members' socializing.

Quiz

We'll discuss the quiz in more detail as an example of employing mundane technology as a methodological instrument. The quiz had two purposes: 1) to gain an understanding of our users' contexts and technology usage and 2), to investigate the utility and effects of using a system like Rhub for research. We use the term "quiz" rather than "questionnaire" to convey its informal, lightweight nature. Questions were delivered using Rhub to members of two groups (Alpha, and 'Iota', a group of academic colleagues), and thus could have been received by or replied to using SMS, IM, email or the web.

¹ With the exception of MMS, which Rhub does not send but can receive and process

In the spirit of cultural probes [4], the questions were designed to gain an understanding of context and practice rather than glean quantitative data and were phrased to illicit responses about the user's current context. There were 16 questions in total, organized into six themes: location, activity, presence, technology availability, technology use and technology preference. For example, one question from the activity theme was: "what's your position: walking, reclining, jumping, sitting etc..?" and a question from technology preferences was "right now, would you prefer to get a call, SMS, email or IM?".

The quiz took place over 80 days, and we received 102 responses from 590 sent questions yielding a response rate of 17%. We sent questions in batches, each manually triggered, to 15 randomly selected users who each received a random question from a pool of 16 questions. If a response is received after a short period of time, we assume the participant is replying about the *present*, rather than a recollection of the past or anticipation of the future. After excluding two outlier responses, we found that 37% of answers were sent within two minutes of the question being asked, 69% replying within ten minutes. This suggests that most responses might be considered representative of the present, and as such, a useful tool for contextual inquiry.

Although questions could have been delivered using any of Rhub's supported channels, 73% of questions and answers took place over SMS. This was due to the higher availability of SMS: almost all users had registered a mobile phone number, and mobiles can always receive a message. With instant messaging, for example users had to have registered an instant messaging address with Rhub and be online at the time of the quiz to receive a question that way.

RESULTS AND DISCUSSION

Usage across the supported media varied depending on the time of day. During work hours for example, the majority of usage is via the web. After hours, the balance shifts and SMS and IM make up a greater proportion of usage. Because of Rhub's usage of 'push' mediums such as SMS, IM and email, the value of logging into the website is diminished – the information normally comes to them. For an average week, only 33% of users will log in to the system whereas 75% of users will have at least one message pushed to them during an average week.

To illustrate the style of cross-media messaging that takes place, consider Table 2, an (anonymised) extract of early Rhub activity.

Table 2. Example Rhub messages, altered slightly for profanity

#	Source	User	Message
1	Web	Roy	Anyone keen for my Special Pasta 5pm before swimming to Embassy Hotel - pre spa drinks?
2	SMS	Liz	I'd dig it
3	Web	Kon	I like the idea of pasta and drinks, but you do realise it is pouring down rain, right?
4	SMS	Bill	Swimming in the rain is the great! Pasta i can do without
5	SMS	Carol	Swimming in the rain is fun. Pasta would go down a treat. 7 Exams i can do without
6	SMS	Sue	Don't tease me when i'm interstate you lamers!

7	SMS	Roy	Pasta and pool ready call bill and carol for a lift.
8	IM	Greg	I hate you guys, I can never have a quiet day in.

Awareness of use

Through interviews and examination of messages, we noted a general awareness amongst participants as to how they thought others used communication technologies, how communication technologies should be used, and reflections on their own use. This applies to Rhub, as well as other communication technologies. For example, one participant noted "during the day, I'll always email Therese because she's at work and reading email. During the evening I'll text her."

Participants described noting who was online when they were, who sent messages to the group and who showed up at events, and in turn using these observations to shape their own behaviour. For example, if a person was regularly seen using Rhub, then sending her a Rhub message was seen as a reliable way of contacting her. If a person frequently sends messages to the group indicating they will come to an event yet don't show, their response might be disregarded in future. Others' perceptions can sometimes be made obvious; one interviewee told us "people think I use it more than I do. They'll come up to me and say, 'did you read that thing on Rhub?...' [when I didn't]".

Participants were also aware of the system as research prototype. When we asked some participants why they didn't invite their friends to the prototype, even though they thought it to be a good idea, they responded that they didn't want to contribute extra burden on our resources.

Appropriating existing technologies

Reusing existing communication technologies for our own system has both benefits and challenges. From a research perspective, it was beneficial to be able to deploy the system for a long time as participants used their own hardware and software rather than researcher-loaned. As the system utilised technologies people used on an everyday basis it significantly lowered the barrier for entry and use.

Rhub was also useful for overcoming disadvantages with particular mediums. For example, many interviewees considered messaging on mobile phones slow and enjoyed being able to participate using a computer when one is available. One Rhub member did not own a mobile phone, and using Rhub, could now stay better up to date with activities within the social group, as coordination was usually done via SMS.

We found the primary disadvantage of reuse is that people tend to interact with the system in the manner of the technology they are using. For example, we observed Rhub users sending rapid short messages when they were receiving messages via IM, while others receiving messages via SMS preferred less frequent, longer messages. Originally the console insisted on a special syntax for sending messages; however participants quite naturally tried sending a plain text reply when they received a group message. Resultantly, we quickly altered the design to accommodate this usage, and now 67% of group messages are sent this way, with only 22% using the full canonical syntax.

While there are many usability disadvantages to the text-based console, its utility and accessibility provided enough incentive for people to learn its usage. Overall errors were low, with an average

console error rate of 21% over the first 25 weeks of individual's usage. Rhub attempts to provide contextualised help when it cannot parse input, and each received message contains a short hint at the end, informing people how to compose a reply. Errors made using SMS were less likely to be retried with alternative syntax, with 65% of attempts abandoned after one attempt, compared with only 21% via instant messaging.

Pervasive contact

One of major benefits of Rhub was seen to be its "pervasive contact" aspect. When communicating amongst a group it can often be difficult to negotiate use of technology: some people might check email regularly, others not, some might use instant messaging during work hours, but never at home, yet for others the reverse might be true. Rhub smooths over these differences, giving senders a high degree of confidence that their message has reached everyone in the group.

Pervasive contact can also have negative aspects, for example dealing with a large number of messages or notifications. Participants however reported that the benefits of group messaging outweighed the negatives. Members actively worked to establish "proper" usage, for example chastising (in person or via Rhub) users who were sending too many messages.

When group messages are segmented by conversation, we found that most (63%) tended to happen within a single medium (usually SMS). 29% of conversations took place over two media and only 7% taking place over three. Usage was different between channels, for example messages from phones were less likely to contain reference to time and location compared with messages sent from other mediums.

Half-invites

The lower degree of intimacy with group messages compared to person-to-person messages was considered as positive for coordination purposes, fostering a kind of "half-invite" style. Invitations were sent to a group, usually stating a small event was taking place, and that others were welcome to come. Others might reply to the group that they were interested and coming, or simply turn up. Because of its informality, there were not usually any negative replies, as one participant said, such invites are easy to ignore and that if there are no replies, you'd assume there's no interest. As group invitations are easily composed, and there is little pressure on others, participants reported a greater quantity of invitations sent than before using the prototype. Some participants reporting attending more events and feeling more socially connected than they did before.

CONCLUSION

Part of the appeal of using mundane technologies (from both a general and research perspective) is that their ubiquity can in turn

lead to higher up-take of the system because of the reduced "friction" of use. Users (or study participants) can reuse devices and software they already own, use and carry around; knowledge about use can be re-applied; social norms and habits inherited.

There are also potential pitfalls with re-use. Characteristics of a medium - such as a monetary cost of use in the case of text messaging, or limited mobility in the case of instant messaging - impact the usability, utility and accessibility of services delivered through a mundane technology.

Cross-media systems, which can be used across a variety of technologies, might provide additional flexibility for the user, allowing them to select a technology that best suits their current context and needs. While usability may not be ideal if a consistent interface is sought for all media, we found that the systems' utility and accessibility overcame such problems.

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