Interaction, Privacy and Profiling Considerations in Local Mobile Social Software: a Prototype Agile Ride Share System

Sunil Ghelawat
Queensland University of Technology
Brisbane, Australia
s.ghelawat@qut.edu.au

Kenneth Radke
Queensland University of Technology
Brisbane, Australia
k.radke@qut.edu.au

Margot Brereton
Queensland University of Technology
Brisbane, Australia
m.brereton@qut.edu.au

ABSTRACT
Agile ridesharing aims to utilise the capability of social networks and mobile phones to facilitate people to share vehicles and travel in real time. However the application of social networking technologies in local communities to address issues of personal transport faces significant design challenges. In this paper we describe an iterative design-based approach to exploring this problem and discuss findings from the use of an early prototype. The findings focus upon interaction, privacy and profiling.

Our early results suggest that explicitly entering information such as ride data and personal profile data into formal fields for explicit computation of matches, as is done in many systems, may not be the best strategy. It might be preferable to support informal communication and negotiation with text search techniques.

Author Keywords
Agile ride-share, dynamic ride sharing, design, informal messaging, user-centred design

ACM Classification Keywords
H.4.3 Communications Applications, H.5.2 User Interfaces, H.5.3 Group and Organization Interfaces.

INTRODUCTION
The advent of mobile communications and social software points to interesting design possibilities to address problems facing local communities.

However social networks take on a different character in local communities than in virtual communities. (Brereton et al 2009) Because communication and sharing occurs face to face as well as through ICTs, concerns relating to interaction, physical security, trust and privacy are heightened and take on a different form. Many people deal differently with their neighbours than with people that they will not normally encounter in their daily living.

Existing social software communities such as Twitter, Facebook, Ebay, Wikipedia have developed techniques for identifying potential network "friends" and assessing interactions. These include profiles, feedback ratings, numbers of connections, barnstars etc. However it is an open question how suitable such systems are when assessing ones neighbours and colleagues with whom one has all sorts of other social relations in the lived world. Moreover, the viability of local mobile social networks depend upon there being sufficient uptake within a locality in order to make them work. Uptake rates in local contexts have to be much greater than for global virtual services with global reach. In the case of the study in this paper that explores the use of local mobile social networks to support ridesharing, issues of one's personal bodily safety are also at play in making the decision to share a vehicle ride with others, which is not the case in many social networks with a greater virtual communication focus.

In this paper we present the trial of the first iteration of a mobile social software system to support ad hoc ridesharing. There are several attempts ongoing to develop successful agile (also called dynamic) ride sharing systems, defined as "a system that facilitates the ability of drivers and passengers to make one-time ride matches close to their departure time, with sufficient convenience and flexibility to be used on a daily basis". (www.dynamicridesharing.org). Through this project we seek to understand how to make such a system work. The more general HCI research problem is to explore new approaches to designing local social mobile software systems that work to design participation in such a way that local social networks grow to be viable and trustworthy in local communities.

BACKGROUND
The advent of mobile phones and social networks has led to several new systems to support ridesharing such as Zimride, Avego and GoLoco. At this stage, most new systems are based upon a particular phone or social network platform. An investigation into a variety of existing ridesharing approaches (Brereton et al, 2009) led to the conclusion that in order to develop sufficient critical mass it is necessary to (a) work across platforms and channels and run on a wide variety of phones (b) consider aspects of local customization, geography and incentives and (c) work to explicitly grow local social networks specific to ridesharing, because ridesharing networks may only partially overlap with existing social networks.

Moreover ethnographic and trial studies indicate that existing systems may make assumptions about peoples' travel behavior that do not hold true when social relationships are taken into account. People may go out of their way for friends (Wessels, 2010) and prefer not to charge them (Allen, 2009) etc.

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Agile ridesharing seeks to overcome a number of the barriers that arise in ordinary carpooling, which at best achieves uptake rates of 20% of the target community (Queensland Government, 2008). Principal barriers identified in uptake of traditional ridesharing systems are that (a) people find it impractical to be committed to a fixed travel routine with others (b) it is difficult to find partners who share the same routine and route (c) it may be socially awkward to share with some people (d) it may be unsafe to share with strangers and (e) there is insufficient incentive for some to share.

Mobile social technologies offer the opportunity for people to offer and request ad hoc rides to their network of riders in real time or near time. If there is sufficient participation in such activity, then there would be sufficient availability of rides and riders that such a service could be a viable alternative to individual car use. This has potential to assist areas with insufficient public transport systems, particularly in many outerlying urban areas that have insufficient population density to be well supported by public transport. However, the principal research question is, what are the conditions for such effective local mobile social networks to grow?

DESIGN METHOD

The project is using a Reflective Agile Iterative Design method to explore the design requirements for an agile rideshare system (Heyer and Brereton, 2010).

The design approach aims to:

- Understand community practices through ethnographic fieldwork
- Explore key design hypotheses by designing and deploying working investigatory prototypes for use by a segment of the community;
- Gather fragments of ethnographic data from the prototype in use;
- Build communities of use as the prototype is refined and extended;
- Understand the factors that persuade or dissuade others from joining.

The approach uses the simplest functioning technology prototypes deployed over an extended period, to understand how people use them in their daily lives to augment their activities. Prototypes have simple functionality that aims both to provide benefit to those who use them and to explore design hypotheses. Prototypes when successful are not removed, but are grown and extended. Initially a few motivated people are invited to participate, amongst those less motivated, and a simple prototype is conceived and deployed. As the range of use and barriers to use are understood we refine the prototype to remove barriers to use, so that people who are less motivated or need more incentives feel inclined to participate. In this way, we aim to explore a path to critical mass. The prototyping approach is supported by interviews and group discussion.

A simple rideshare prototype was designed to operate using a common web browser, so that it could be accessed using any web-enabled phone, laptop and desktops, thus maximising the number of people who could participate in sharing. The prototype had a very limited functionality in that it only allowed people to send ride messages and information about seeking and offering rides. It was possible to either enter informal ride messages or to simply to state the factual details about the ride in terms of origin, destination, journey start time and whether seeking or offering a ride. Figure 1 shows the page where a user can post or request a ride.

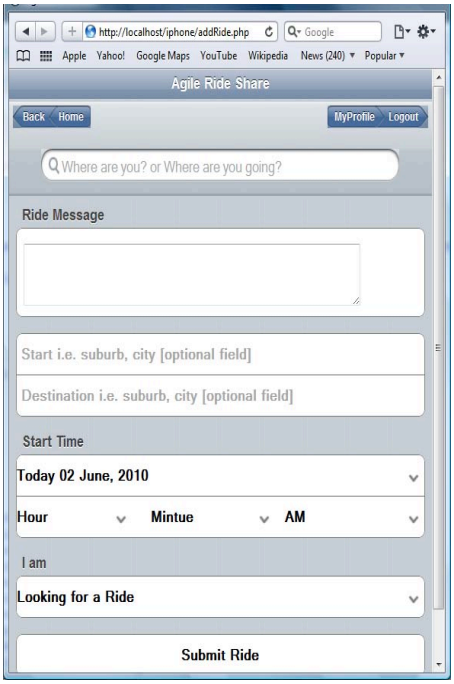

Figure 1: Screenshot displaying post ride page

FINDINGS

The implemented system was used for four weeks by 8 users who sent 51 messages about riding. By examining these messages and interviewing the participants about their experience, conclusions about the design direction were drawn from the use and experience of use of the prototype. Three main design considerations were identified at this stage of the work:

- Informal or formal methods of communication,
- Network and group management,
- Privacy and profiling.

Informal or formal Interactions

Informal ways of expressing rides (58%) proved far more popular than filling in formal fields (20%). 22% of messages had both formal and informal fields filled out. These early statistics could be influenced by aspects of the interaction design and as a result they are design leads rather than evidence per se. However interviews also determined that people preferred informal messaging and uncovered reasons why. Example messages are shown in Table 1. The first ride message shows the participant was offering an opportunity to share a walk. The second and third ride messages show participants' ways of connecting with other people and reflect their constraints.

People were often quite flexible about when they travelled.

They had various constraints relating to parking, childcare and off-peak traffic hours, work or other commitments, however these were often variable or contingent in such a way that they would be cumbersome or impossible to express in formal fields. Messages made it easier to express travel intentions succinctly. Moreover messages gave the opportunity to share some of the personal context of the ride offer or request and to add additional information or sentiment. "Afternoon walk home anyone?" feels different than reading travel information.

Bio-Guy:	"Afternoon walk home"
MaidInMerryville	"Leaving Campus for Cutler Park at 1pm - meter expires. Parked on Catherine St. Let me know if you need a ride"
Fred	"Is anyone going past Paddington this morning to Campus by 9:30am

Table 1: Example agile ride share system messages

The desire to meet and share was an important factor in soliciting travel sharing, such that people solicited shared walks and bus rides as well as private vehicle rides.

Messaging, rather than filling out formal fields, allowed people to give only as much specificity as they felt was needed to open a negotiation about sharing. Thus many aspects of details of the ride were left unstated in messages. One participant commented"*If you are going in vaguely the same direction then we'll talk. If you are in a car 2ks is nothing. Those things are all highly negotiable. The system should support the variety of behaviours that people want, so you can be specific or not."*

Many existing agile ride sharing applications use several structured fields for adding information about rides. Rides are considered to be fixed or part of a recurring travel schedule. For instance, the user needs to fill in fields like start location, destination, start date, start time, flexibility and additional information to submit the ride in the system. This approach makes it easier to collect data and can easily be used by search algorithms to match the rides. However the system-centred approach is quite inflexible and the interactions are time-consuming. Although it is more challenging to extract data from the informal messages for ridematching, it is possible. In addition people may prefer to interpret such messages by themselves. One participant commented "*The most important thing to me was to describe the ride as a walk, so the message was the easiest way to do that. If it is the same route everyday it might be faster with drop downs and click or a tick box. Or some way of making repeats fast would be good. The problem is those things will go out of date and people will wonder if this is still current. And would you even contact them to find out? If I saw it was a year old, I probably wouldn't respond. It introduces issues of currency."* By contrast, informal messages are useful ways of connecting and learning people's habits even if rides are not shared. A fledgling system with insufficient participants to create a large number of ride matches could still have utility if it allows friends to share information about travelling and meeting, providing the hooks for participation that might eventually lead to growth in actual ridesharing. The agile iterative approach also allows participants to be part of the system development.

Groups or networks in ridesharing

The early prototype allowed people to specify their own ride groups with certain invited members or to post messages to all riders. As the first trial began with a community of only 8 participants, early users tended to post to the whole community. However the use of the system led to reflections from participants about how they would like groups and networks to develop.

In existing applications there is a tendency to support organizational ride groups where members of the organisation owe a duty of care to each other (excluding other participants), or to utilize existing social network designs such as Facebook. In this design we are seeking to understand the conditions for network formation that might grow out of local interaction that is not necessarily developed through Facebook (since many people are not active Facebook users) or through organizational links, since many people do not work in large organisations.

This raises a question of how to ensure the safety of riders. It is particularly a problem with groups formed around locations rather than organisations. If the moderator of the group who admits people to the group effectively takes responsibility for the credibility of all members, then this is an enormous responsibility. By contrast, when people are responsible for building their own personal ride networks and take personal responsibility for who is in their ride network, the line of responsibility is clear.

A local analogy of baby sitting circles was raised by one participant. "*In a babysitting circle ten or so couples agree to swap babysitting favours. The group meets every three months over coffee and cake and tallies up credits earned and used. There is a discussion about whether anyone knows anyone else who wants to join the group. There has to be a consensus to allow people in. However you still have the choice as to who you ask to look after your children and which babysitting requests you accept."*

Another participant raised an experience of sharing: "*I used to work somewhere over 50Ks a way and I used to offer lifts to anyone basically. One guy was a very big guy at least my height 40 or 50kilos heavier than me. It's a small car. I'm in the drivers seat and he is in the passengers seat. One day he was irate and bashing his hand into his fist like this because of something in a football game and he just went off about it. I'm sitting just this far away it's a very small car and we are doing 100k down the highway. Let me tell you I just wanted to… time to start looking at what kind of person I let into my car.*"

The participant discussion led to the conclusion that the responsibility of moderating a group is too high and that each individual has to be in control of their own network and who sees their messages. Participants felt that they would not like to share information that they had just left their house to a large number of people on a regular basis. Moreover on some days they might just not feel like sharing or might only want to share with close friends. It was felt that in many social networks it is very difficult to see who else can see your information and to get an external view of what your page looks like to others even though you have access to your own settings. Moreover

many social networks do not use secure protocols and can easily be observed by third parties. However a key perceived benefit of the system was that it would be able to pull people together that didn't know each other. It was felt that this was best done through a referral chain, similar to that on the social networking site LinkedIn, where people refer people to other reliable friends, either through the system or face to face.

The emerging ethos for ridesharing was that while it is important to grow participation, which adds value to the service, the system should aim in all respects to respect privacy and empower people to protect their privacy. "The system should care about its users and their privacy first and foremost". A practical means by which people achieve such privacy is to post information that is not very specific to a broad group to ascertain interest before making specific negotiations with a few.

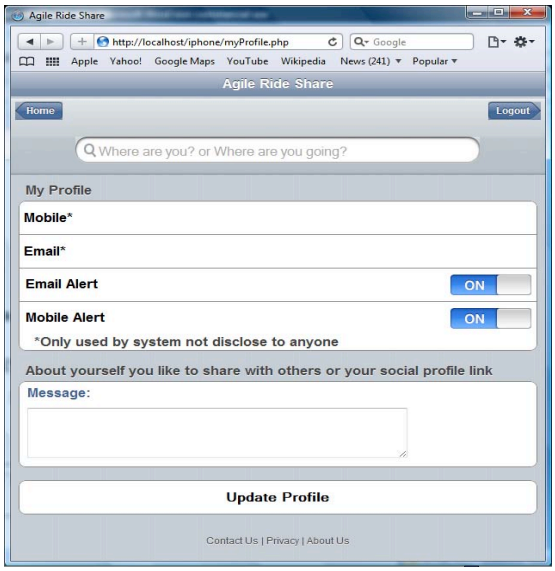

Figure 2: Screenshot displaying revised MyProfile page

Profiles and Feedback

Privacy is one of the barriers to participating in ride sharing systems. Many existing systems ask users to fill out personal information such as name, age-group, gender, occupation etc. in a structured form in order to participate in the service. In our limited system trial we found this to be somewhat of a conundrum. People are concerned about how their personal information is used by the system, how it might be disclosed to others, and whether other peoples' information is accurate. Most people did not fill out information requested for the profile such as gender, town of residence etc. One participant commented "*Before I let anyone in my car I want to know lots of info about them … But, if you formalise it on a form, that's a lot of questions and a lot of very personal information."* The difficulty is perhaps that what people want to know in a condensed form is the kind of information that people let out through interaction in a relationship over a long period of time. The predominant sentiment expressed was that knowing the person or someone who knows the person and meeting in the physical world diminishes the importance of the profile. Still a profile may be an expectation of some participants. In the next version of this system, (Fig 2) profiles will be simple and free form. We will examine how they are used and how they evolve.

It was felt that feedback ratings might be problematic because people were rating personal relationships that are different from those conducted only in the virtual world, such as on Ebay. This is an open question for exploration in the next prototype. While one approach will be to see how this has worked in other systems, our experience with the RAID process is that slight changes in interaction design enables different kinds of connections and interactions and culture to form. Thus an open format of feedback will be explored through an embedded prototype.

CONCLUSIONS

Our early trial of a limited mobile social software system to support ridesharing found that informal means of expressing rides was far more popular than filling out formal fields. Moreover messages about riding and meeting within friendship circles had utility beyond just sharing vehicles and thus had potential to grow participation from people even when they were not looking or offering a shared ride.

While making ride matches is very important, it was found that the best strategy might not be to explicitly enter information such as ride data and personal profile data into formal fields for explicit computation of matches, particularly during early stages with fewer participants. Enforcing such specificity can make the system cumbersome to use and may not reflect accurately what participants want to express about themselves or their rides. As a result our next iteration of the rideshare system will explore free text searching/parsing to assist matching.

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