Understanding the Fabric of Social Interactions for Ridesharing through Mining Social Networking Sites

Seyed Hadi Mirisaee **Margot Brereton** **Paul Roe** **Fiona Redhead**
Queensland University of Technology
Brisbane, QLD 4001
s.mirisaee@qut.edu.au m.brereton@qut.edu.au p.roe@qut.edu.au fiona@dotsec.com

ABSTRACT
The design of applications for dynamic ridesharing or carpooling is often formulated as a matching problem of connecting people with an aligned set of transport needs within a reasonable interval of time and space. This problem formulation relegates social connections to being secondary factors. Technology assisted ridesharing applications that put the matching problem first have revealed that they suffer from being unable to address the factor of social comfort, even after adding friend features or piggybacking on social networking sites. This research aims to understand the fabric of social interactions through which ridesharing happens. We take an online observation approach in order to understand the fabric of social interactions for ridesharing that is happening in highly subscribed online groups of local residents. This understanding will help researchers to identify design challenges and opportunities to support ridesharing in local communities. This paper contributes a fundamental understanding of how social interactions and social comfort precede rideshare requests in local communities.

Author Keywords
Ridesharing; Social design implications; Social fabric; Social context; Local communities

ACM Classification Keywords
H3.4. Social networking.

INTRODUCTION
Ridesharing applications, designed to arrange ad-hoc rides in real time through mobile social software, seek ways to grow participation to solve the conundrum of having enough drivers and passengers. The growth of social networks provides opportunities for ridesharing applications to launch social networking features in order to support ridesharing in users' existing online networks and increase ridesharing activity. However, Human Computer Interaction research explicates the fact that design for collaborative systems without considering the social interactions and communication of the collaborative environment are doomed to fail (Ackerman 2000, Suchman 2007). Ridesharing applications have been based on the weak assumption that having features to connect users to their online social networks will increase participation within their existing communities. However, findings from a recent attempt (Avego 2013) showed the failure of this idea.

Instead of using social networking features to grow participation, this paper considers social connections as the core of sharing among people and observes social groups (e.g. active Facebook groups for a residential locality) with a broad set of motivations to understand the fabric of social interactions for sharing; the challenges and opportunities for sharing and in particular, sharing travel resources and activity (i.e. cars, petrol, time in the car). The term "social fabric" refers to a composite of both the physical and virtual sharing infrastructures (social networking groups, community email lists, sports clubs, local school events etc.) and the networks of relations formed within and between them.

This paper investigates the characteristics of ridesharing in local suburban community Facebook groups by using an online observation approach. In addition to online observation, occasional interviews with online participants were conducted to understand the context of online discussions. Also, researchers live in the area and have significant local knowledge. Observing online groups for sharing and discussion within a suburban locality has shed some light on how nascent ridesharing conversations and practices form in these online networks and how they might be encouraged and supported. This knowledge helps researchers to identify challenges and implications for design that supports ridesharing.

COLLECTIVE IDENTITY IN SOCIAL NETWORKING GROUPS
Turner et al. (1994, p.454) defined social identity as a concept which 'refers to social categorization of self and others, self-categories that define the individual terms of his or her shared similarities with members of certain social categories in contrast to other social categories'. A social identity is a symbolic representation of a group which presents shared identity bonds (Jiang and Carroll 2009). A shared identity bond is not built upon interpersonal contact or mutual acquaintance among individuals; but instead, it is based on one's acknowledging the commonality one shares with others, such as for example, living in the same local community, or being a member of the same club (Jiang and Carroll 2009). Shared identity bonds explain the interactions happening in many social networking groups on Facebook which are formed on the basis of a collective identity. Membership in these groups does not necessarily mean a relationship between members, but rather a collective identification among the members as a basis for

OzCHI'13, November 25 - 29 2013, Adelaide, Australia

their relationship (Jenkins 2008) to the group. This collective identity encourages local community residents to use social networking sites (i.e. Facebook) as a source of seeking information or offering services such as buying things, announcing a local event and occasionally seeking a ride or providing transport sharing. This sharing behaviour is an inspiration for this research to study the social fabric of ridesharing in local communities.

RIDESHARING

The main aim of ridesharing is to increase vehicle occupancy to reduce the number of vehicles travelling on urban roads (Morency 2007). Ridesharing is a complex and highly negotiable activity because people's daily travel is complex. For example commuting to and from work may include other activities such as child pick-ups, shopping, or going to the gym (Heinrich 2010). The close sharing of physical space and time in transport and the coordination efforts required to enable it make ridesharing more complex than many forms of technology-facilitated sharing. Aspects of trust, privacy, bodily security, social comfort, and coordination (Heinrich 2010, Abrahamse and Keall 2012) are all brought to bear. Ridesharing applications such as Rideshare, Zimride, and Carpooling leverage Facebook features to establish a better communication among users in order to mitigate some of these concerns and promote participation. Features such as a Facebook login or inviting friends from Facebook contacts are commonly used in these applications under the assumption that providing social networking features encourages networking among users and resolves communication barriers. However, a recent attempt by a ridesharing application to connect communities with similar interests via their application (Avego 2013) showed that this assumption falls short. The application can brought people together but people need to work out the subtle nuances of their ridesharing group (Avego 2013). These applications are still using the traditional, structured pattern of origin, destination, and time to create and match rides and ignore social factors such as negotiations among riders in order to share their interests, constraints, and flexibility for arranging a ride (Brereton, Roe et al. 2009). Designing a ridesharing application for local communities is still difficult since they are constructed with only ridesharing in mind, whereas people's social networks in communities are constructed with friendship, local activity and local information sharing in mind. Blending these two does not necessarily work.

METHOD

In this research we sought insights into the fabric of social interactions through which ridesharing happens, by examining local community groups on Facebook. This is certainly only a very partial view of the whole fabric, but it is a starting point.

Locality

The research focused on an outer dormitory suburb situated approximately eighteen kilometres from the central business district of a city of two million people. This suburb is connected to metropolitan areas by only one main road. It depends highly on neighbouring community facilities including secondary schooling, library services, health services, local government offices, and recreational facilities (Redhead and Brereton 2006). The community members frequently travel out of the suburb to access facilities or commute to work and school, which makes the main road very congested in peak hours. The community has been highly collaborative in solving its issues over the years. The collaborative characteristics of this community provide an opportunity to share travel. We therefore decided to study the characteristics of social interactions within the community (a) to understand their nature and (b) to see if any ad hoc travel sharing arises within the community and the nature of the interactions that lead to it.

Approach

Conversations from two local groups on Facebook in this same locality are mined. Researchers are legitimate members of both groups who live in the neighbourhood. They requested and received permission to mine conversations from the owners of the group and have anonymised all conversations before publication. Researchers argue that in the cases that participants who are involved in a discussion may come and go too fast for informed consent, a waiver of informed consent may apply (Hine 2008). Therefore, a series of actions were taken in order to protect members' privacy such as changing participants' names and their suburbs.

The first group is a local one for selling second hand items in the area. It has more than 2800 members. In this group, people are either requesting or offering goods. Messages related to ridesharing in this group are mostly about helping each other to deliver things. The second group has 1290 members and is a place for the local community members to catch up on local news, events and issues happening in the locality. People share information such as events, issues in the suburb, new development plans or new services in the area and so forth. Local businesses can post information on the goods and services they provide as well.

The observations were made over ten months and about 17000 conversations from the two local Facebook groups were mined. An algorithm was designed to search for terms related to transport and travel using predefined keywords on daily basis. Later, researchers manually reviewed the refined conversations by the algorithm to identify if they were related to ridesharing. Among these conversations more than 89 conversations were about ridesharing or related to the local traffic in the area. The reason that a few conversations were about ridesharing was that these groups were not created for ridesharing. However it is important to study and understand the nature of nascent conversations, even if these conversations are sparse, as these are seeds from which more and greater conversations may grow.

Understanding the Fabric of Social Interaction for Ridesharing

We analysed conversions about rides in social networks in order to understand how ride offers and requests arise

in these contexts.

Nascent Ridesharing Conversations Emerge from Local Transport Needs and Events

People who live in the same area establish social interactions around topics relating to local transport needs and events and rides emerge from these interactions. For instance, lift offers emerged in a conversation about railway museum which had 31 comments:

***"Ann**: ...Has anybody been out to the workshop rail museum to the Thomas by the sea exhibit & activities? ... Feedback? ... Thanks :)*
Alice**: Not with the rescue going on. However it's 3 levels of different things. Including a smoke room, huge ball pit, art room, the list goes on. **I am heading to rail way on Tuesday if you would like a lift. I have plenty of room …
***Kim:** Sorry Ann also I can give you a lift if I go"*

These conversations normally happen in public in the very early stages. Parties engaged in the conversation then discuss details in private conversations or face-to-face meetings. Some of these conversations were followed up which is explained in the following sections.

Friendship over the financial incentives

In this locality, it is often the case that community members offer transport for short distances to help out, to build social capital and possibly to extend and make friendships through requests and offers. In most cases financial incentive is not the top priority. Messages such as the below one were seen frequently in the dataset.

Bernie: Does anyone go from Riverbank over the ferry in the mornings and back again in the afternoons who wouldn't mind giving me a lift? Have to start working in city in a couple of weeks and would rather not get the train
Sam: what time in the afternoons? We could probably do the afternoons.

Privacy and Self Presentation in Groups

Unsurprisingly, we observed that group members adopted strategies to protect their individual privacy and safety. The strategies observed were largely similar to those found by Lampinen et al. (2009), that is, group co-presence management strategies. Some strategies related to group composition and communication as a whole such as approving new members if they were introduced by existing members of the group. However, others related directly to the ridesharing activity at hand, for example, preventive strategies which Facebook users applied to avoid tensions in groups such as choice of suitable communication channel, self-censorship and attitudinal approaches. Examples in mined conversations showed people shifted to different communication channels to limit the conversation to parties who identified themselves and being interested in ridesharing. For example:

"If anyone else attends UNI MTG we might be able to set up a car pool. Let me know on example@yahoo.com.au".

An example of self-censorship was started with this offer.

"*Hi there. Is anyone able to offer me a lift from M Post Office this Wednesday at 9am to anywhere close to the city?*"

Although the poster did not receive any comments online for that post, the follow-up interview with her identified that at least two persons in that group were interested to offer a ride, although they did not want to make the offer on Facebook. Instead they mentioned their offers in face to face incidental meetings at the local shops or school.

The occurrence of several offers or requests for courier sharing in both groups indicates that attitudinal approaches such as general trust and acting responsibly are at work in these groups, particularly when the stakes are lower and one is only risking goods and not personal physical safety such as:

"**Juan**: *Hi there peoples I was wondering if anyone could please pick up 2 little kids bikes from upper riverside and deliver them to leich at all my twins...*

***Suzi commented**: I could pick them up Wednesday and bring them to you on Thursday if that suits.*

***Molly commented*:** *I plan on going to museum next Tuesday. I could bring… if you could meet me there"*

Representing nascent ridesharing conversations in a more static way

The dynamic and ephemeral nature of Facebook interaction causes people to be unaware of opportunities unless they are interacting with the group at a specific moment. The second hand item group has received more than seventy daily posts on average, which means that the opportunity for members to be informed about a specific topic is very low unless they are willing to constantly monitor or to search for a topic. Even if a ridesharing application mines the related messages on Facebook in order to represent them in a more static way to local communities, the social context around a ridesharing conversation and implicit information within the conversation make decontextualizing and extracting messages difficult. The following example illustrates that much of the information about the sharing arrangements that happens in social networking sites is implicit and therefore difficult to process if striped:

"*Rosie … I am picking something up from Michelle today - would you like me to pick it up for you?*"
"Chris, I am at Highlands Wed so can collect for you if you want. Can drop at Liz with her stuff I forgot today!"

LOCAL RIDESHARING GROUP FOR THE LOCALITY

After identifying the interest for ridesharing in the locality, the researchers created a local ridesharing group and invited local members via their local groups. The aim of this local group was to promote ridesharing more explicitly in this location. This group has not grown like studied local groups and ended up with only 51 members. Only few numbers of rides have been shared in the group:

"*Just saw an earlier post; I have a student who likes to come across ferry about 5.30 p.m. Is there anyone who comes down Hill Rd or goes near Bird Rd; that he can get a lift with*"

No comments had been submitted to offer a ride to any of ride requests. We followed five members who shared

rides in this group and two of them got back to us by mentioning that they did not get a lift using this group. The preliminary results from this group again identified the importance of social context around ridesharing conversations which created a strong social identity and encouraged local members to share their rides.

IMPLICATIONS

Ridesharing conversations in local social networking sites arise from within a general context of local conversation, local contacts, shared schools, shared neighbours, shared shops and shared needs. Collective information practices (Radke, Brereton et al. 2011) can be seen to develop in these groups, such as cultures of offering to transport goods, general offers made online with specific details often taken offline, or through other communication channels. Examination of ridesharing messages from within local conversations hints at the reasons that applications designed explicitly for ridesharing face the challenge of being decontextualized, even if they explicitly seek to build on friend networks from social networking sites. Ride needs and conversations emerge in social contexts and one can often not easily strip the ride from its social context and package it into the different context of a ridesharing application. However the findings point to opportunities for finding better ways to support ridesharing from within the social fabrics in which they arise.

It has long been understood (Bødker 1991) that interfaces need to be understood in their social context. However, the lessons learned by established ridesharing software companies and by mining social networks provide a salutary lesson about just how hard it is to manufacture social context for specific purposes. The intricacies of social fabrics and the etiquette of how and when to request and make an offer cannot and probably should not be abstracted. Other strategies that take a conceptual starting point well within existing social fabrics may be more productive.

IN CONCLUSION

This paper has revealed that ridesharing offers emanate from large online social networks of people with common interests. Although these people are not necessarily close friends, the social and group identity in the sites creates conditions in which some members feel sufficient trust to offer to share rides and goods transportation. The unique characteristics of this particular locality, such as being isolated from the metropolitan area explained social interactions in the community, which may not extend to other local community groups.

This paper contributes a fundamental understanding that social interactions and social comfort precede rideshare requests in local communities. The paper also presents a view of the kinds of interactions through which rideshare requests emanate. This understanding indicates that there are new opportunities for technology supported ridesharing that are based on social identity, social connection and a deeper understanding of cross channel interactions. One implication for future design is to focus on integrating and relaying ridesharing messages collected from local social networking groups in a more static website while considering anonymity and social context. For instance, relaying collected ridesharing messages in a local community website informs members of the community about current rides happening in their local area and may provoke them to join the activity.

REFERENCES

Abrahamse, W. and M. Keall (2012). "Effectiveness of a web-based intervention to encourage carpooling to work: A case study of Wellington, New Zealand." Transport Policy 21: 45-51.

Ackerman, M. S., "The intellectual challenge of CSCW: the gap between social requirements and technical feasibility." Human Computer Interaction, (2000), 15(2): 179-203.

Avego. (2013). "Ridesharing Community: Kinsale Case Study." Retrieved 15 January, 2013, from https://car.ma/blog/2013/01/15/ridesharing-community-kinsale-case-study/.

Bødker, S. (1991). Through the Interface: A Human Activity Approach to User Interface Design, L. Erlbaum Associates Inc.

Brereton, M., P. Roe, M. Foth, J. M. Bunker and L. Buys, Designing participation in agile ridesharing with mobile social software. Proc. OzCHI 2009, ACM Press (2009), 257-260.

Heinrich, S. (2010). Implementing Real-time Ridesharing in the San Francisco Bay Area. Master, San Jose State University.

Hine, C. (2008). Virtual ethnography: Modes, varieties, affordances. The Sage handbook of online research methods. SAGE: 257-270.

Jenkins, R. (2008), Social identity, Taylor & Francis.

Jiang, H. and J. M. Carroll, Social capital, social network and identity bonds: a reconceptualization. Proc. on Communities and technologies (2009). ACM: (51-60)

Lampinen, A., S. Tamminen and A. Oulasvirta, All My People Right Here, Right Now: management of group co-presence on a social networking site. Proc. on Supporting group work (2009). ACM press: 281-290.

Morency, C. (2007). "The ambivalence of ridesharing." Transportation 34(2): 239-253.

Radke, K., M. Brereton, S. Mirisaee, S. Ghelawat, C. Boyd and J. Nieto, Tensions in Developing a Secure Collective Information Practice - The Case of Agile Ridesharing. Proc. on INTERACT (2011), Springer Berlin Heidelberg. 6947: 524-532.

Redhead, F. and M. Brereton, A qualitative analysis of local community communications. Proc. on OzCHI (2006), ACM Press (2006), 361-364.

Suchman, L. A. (2007). Human-Machine Reconfigurations : Plans and Situated Actions. New York, Cambridge University Press.

Turner, J., P. Oakes, S. Haslam and C. McGarty (1994). "Self and collective: Cognition and social context." Personality and social psychology bulletin 20: 454-463.