Designing for participation in local social ridesharing networks – grass roots prototyping of IT systems

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ABSTRACT

This paper explores the possibility of a grass roots approach to engaging people in community change initiatives by designing simple interactive exploratory prototypes for use by communities over time that support shared action. The prototype is gradually evolved in response to community use, fragments of data gathered through the prototype, and participant feedback with the goal of building participation in community change initiatives. A case study of a system to support ridesharing is discussed. The approach is compared and contrasted to a traditional IT systems procurement approach.

Author Keywords

Agile ridesharing, dynamic ridesharing, designing participation, participatory design, HCI, technology probes, prototyping, community informatics.

ACM Classification Keywords

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

INTRODUCTION

Peoples and their governments face the need to reduce resource consumption in order to achieve sustainable living within the earth's capacity. Implementation of initiatives toward sustainable living often begin at the level of policy argument, based on the knowledge of public servants advisors, lobbyists and consultants. This then leads to tenders for procurement of systems to supply goods or provide IT services that support shifts in resource consumption patterns. The role of design in the specification of requirements for such systems, at least in Australia, is limited. While there are likely to be stakeholder consultations, there is little use of ethnographic and participatory design approaches in order to really ground the design of systems in use.

Shapiro (2005) reported on failures in government funded system procurement wherein projects overrun their budgets are cancelled outright or fail to deliver the expected outcomes. Many of the systems Shapiro encountered were provided by well-known software houses, from whom there was and usually is a limited number to choose. Governments, naturally cautious about spending from the public purse, are inclined to choose established providers. Shapiro then contemplates the possible ways that the participatory design community of researchers could act in order to persuade governments to take on the more grounded and experimental approaches of PD citing, among other strategies, the possibility of pilot projects which are important and challenging, but not critical (so that failure can be admitted as a possibility). Projects would be conducted on a modest scale, but with the capacity to scale up if pilots are successful.

Five years on from Shapiro's thoughtful paper, the issues related to PD engagement in significant public sector projects are still pertinent, but the landscape of technologies and internet use has shifted towards mobile platforms and greater social connectivity through web 2.0. In this paper we explore a grass roots approach to prototyping a system to promote agile ridesharing in Brisbane, which recently announced a call for tenders for a limited ridesharing system, since it is recognized that this mode of sharing holds possibilities for easing congestion as well as promoting more efficient resource use. As researchers, we are not in a position to tender, but we have elected to explore the problem using a grass roots, evolutionary, participatory prototyping approach.

With the growth in use of user-centred and "participatory" methods by the design community at large, Beck(2004) has argued persuasively that PD should retain its political focus, being narrowed to exclude work that uses participation just as a design tool without contributing to understanding or challenging patterns of dominance. In this work our interest is to challenge the dominant pattern of government procurement, that favours the traditional IT approach, by trialing a more experimental and grass roots "designing for participation" approach to the design of a public ridesharing system. If the approach is successful, it can potentially show ways to governments of developing systems that better fulfill the needs of the populus by including the populus in the design process in a much more integral way, with the ensuing benefit of reduced waste of public money. We are particularly interested in how we

might engage government departments in a more participatory approach .

Our approach begins with the premise that participation in community initiatives is a matter for design. That is, given well-conceived design interventions, one can begin to grow community participation.

Ridesharing can be classed as a "Tragedy of the commons" problem after Hardin (1968), wherein the paradox of increased personal benefit (for example individual car use) results in decreased social well-being (congestion, environmental damage). Characteristic of such problems is that when a few individuals sacrifice personal benefit and take public transport or share rides, it does not have a significant impact on the problem (in this case congestion and pollution). Rather, it is necessary to get many people to act at once. Thus designs to address "Tragedy of the Commons problems" need to address how to cross the "chasm of critical mass" and grow participation.

DESIGN FOR PARTICIPATION BY DESIGNING IN USE

The design approach employed is an iterative approach drawn from the RAID (Reflective Agile Iterative Development) approach (Heyer and Brereton, 2010) that:

- Understands community practices through ethnographic fieldwork

- Explores key design hypotheses by designing and deploying working investigatory prototypes for use by a segment of the community;

- Gathers snippet of ethnographic data from the prototype in use;

- Builds communities of use as the prototype is refined and extended;

- Understands the factors that persuade or dissuade others from joining. Attempts to progressively remove barriers to use and thus grow towards critical mass.
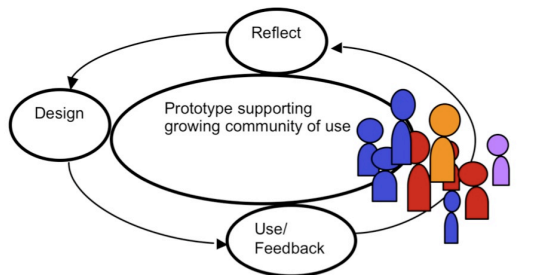

Figure 1: Designing Participation Method

Iteratively design a social technology, grow a community of users and refine the design within the context of policies and incentives

A traditional design approach seeks feedback from "users", who act as design informants to help designers, often in focus groups or laboratory settings. Then in a standard IT systems development approach, with requirements having been established up front, major aspects of systems development are followed by user testing. In contrast, this

embedded prototyping approach aims to evolve requirements and understand authentic use by people in their own contexts, by deploying continuously usable simple prototypes that evolve over time. This approach aligns with Suchman's (2002, p. 92) argument that systems development should be seen as an "entry into the networks of relations, including both contests and alliances, that make technical systems possible".

RIDESHARING CASE STUDY
Introduction to the agile ridesharing problem

The concept of agile or dynamic ridesharing is based on the premise that *mobile social software* could significantly ease logistical problems and provide improved convenience and usability of ridesharing by allowing people to easily contact potential ride-sharers in their extended ride-share social network in real time through mobile phones. This premise is supported by research into ridesharing systems documented in (Brereton et al, 2009). However, it remains an open question of how to design a successful system that encourages sharing while providing necessary privacy protection and fitting easily into people's daily lives.

Design assumptions in ridesharing systems

New mobile technology supported methods of organizing ridesharing (e.g. Gishigo, Avego for I-phone, Piggyback for Android, Zimride with Facebook) have begun to emerge, each with different approaches.

An assumption of most systems is that a significant role of the technology support is to provide automatic ride matching by matching rider to driver based upon origin, destination and travel times. From an information systems perspective, the power of information technology is to provide this kind of automatic data matching, so that a system can efficiently bring together people. However, as acknowledged by all rideshare system providers, aspects of privacy, safety, incentives, personal preferences and ridesharing community building all need to be addressed.

In questioning the conventional problem-solution framework, our prototyping approach has set out to explore how people might want to communicate about ridesharing, while trying to make as few assumptions as possible about ways in which matching, community building, privacy and cost sharing might be addressed?

Exploring design hypotheses with a basic interactive prototype

The 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 (See Figure 1). 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. This strategy was taken in order to learn

what it was like to define rides by entering ride information into formal fields and to allow expression of other information that did not fit into these formal fields.
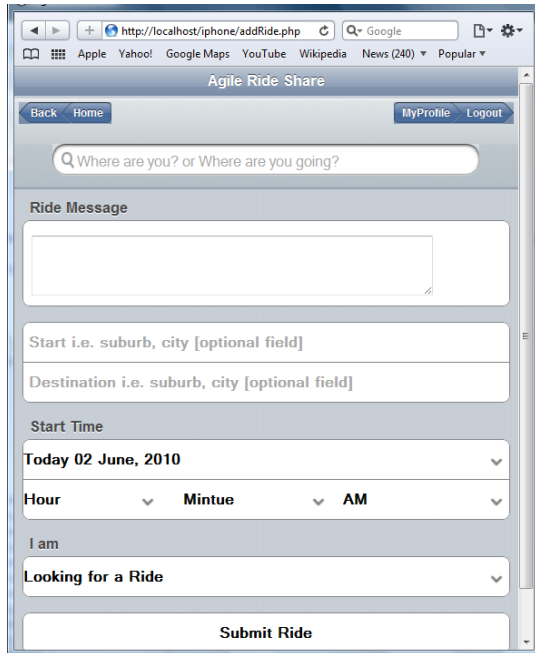

Figure 1. Rideshare prototype showing the ride entry screen

The prototype was used by a group of five researchers who do not ordinarily share rides and a few of their friends, 8 people in all. This is not necessarily a representative sample of people, simply a starting point. After seven weeks of usage, the group convened to discuss their experience of using the prototype. Over twelve weeks of use there were 71 posts to offer or share rides, resulting in 24 responses and 3 shared trips, with 46 posts occurring over 4 weeks in the middle of the trial.
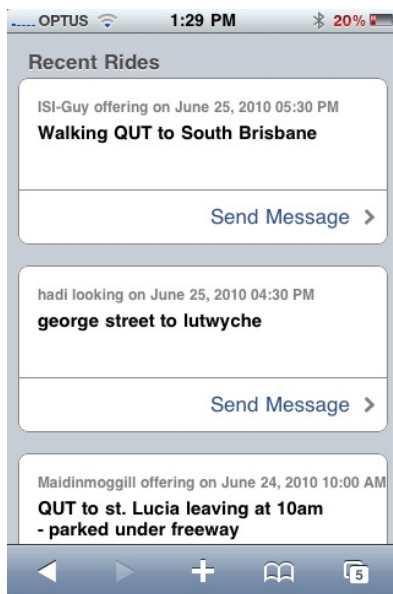

Figure 2 Rideshare prototype showing rides posted

FINDINGS FROM THE DESIGN PROTOTYPE IN USE

Use of the prototype revealed a number of practices that are not supported by current ridesharing systems.

1. People prefer to share informal information rather than to fill out formal fields. 2. They discuss meeting and the opportunity to share walks and bike rides as well as vehicle rides. Meeting has been overlooked by systems that focus on ridematching. 3. People only want to give as much information as is necessary to open a negotiation about sharing.

Formal vs informal information

Informal ways of expressing rides proved far more popular than filling in formal fields. Informal information was very easy to post, as simple as entering a text message (see Table 1) , and much less cumbersome than entering specific information in each field.

Of the 71 posts, 14 contained only information in the formal fields, 41 contained only an informal message, and 16 contained both formal and informal information.

Roamer: "walk - Margaret st to Queen st for lunch"
Bio-Guy:"Morning walk in - very flexible with start time. First meeting at 10am."
MaidinHappyville : "GP to Dunmore. 4 hr parking tyranny. I'll be leaving at 11:30am for Dunmore. Work in coffee shop til pic kids up in dunmore at 3. Then home to hapville. Anyone need meeting in coffee shop or ride to Dunmore ?"
"MaidinHappyville": Child drop off at Dunmore at 8:50am Friday then to GP to meet Fred at 9:30am. Or Fred, I could meet you in church hill or dunmore?"
Roamer; "going home to redmond from GP. anyone sharing ride with me"
Fred;"Is anyone going to greenhill from GP soonish"
Hari: "Gordon park to city 8:30 am "
Roamer;" Redmond to Margaret st by ferry ride. Anyone interested."

Table 1. Examples of informal messages sent using the ridesharing prototype (Names changed to protect privacy)

Meeting and riding

Analysis of the 71 messages revealed that meeting and sharing was considered important in addition to the opportunity to share a private car. Two participants walked to campus and did not have rides to offer, but sought company to walk or take the bus or ferry. Participants offered the opportunity to meet for lunch or at coffee shops.

Flexibility and constraints

Driver participants' ride times were often constrained by the type of parking used (early bird or metered) or the need to do school pickups. Amidst constraints there was also flexibility. People expressed willingness to adjust their travel time in order to share with others. Sometimes a meeting place was flexible.

Constraints were such that they would be cumbersome or impossible to express in formal fields. Moreover messages gave the opportunity to share some of the personal context of the ride offer or request. "Afternoon walk home anyone?" feels different than reading travel information.

Specificity

People often only gave as much specificity as they felt was needed to open a negotiation about sharing. People either (a) knew that others knew where they lived, so didn't need to give specific information, (b) were happy to make a small detour in order to share such that suburb level specificity was sufficient, or (c) were reluctant to give specific information in the general post, but happy to share in follow up private messaging during ride negotiation.

Barriers to adoption and prototype use over time

Barriers to using the system were identified through non-use, through messages posted to the system and through a group discussion held after seven weeks of use. Priorities for the next evolution of the system were determined to be: A) Allowing participants to control who could see their posts, rather than posting to everyone. B) Integration with email and text messaging.

REFLECTIONS

Our goal here has been to illustrate some first steps and early results in deployment of an exploratory prototype in order to explore how to enter a design into the networks of relations between people, in order to understand how to better support those relations.

One of the most important findings of our limited study is that informal ride messaging is not only useful for facilitating matches. It is also useful for extending friendship, sharing ones whereabouts with ones friends, and learning friends travel habits, even if rides are not shared. And this may eventually lead to travel sharing opportunities. As such, informal messaging may play a critical role in growing participation, because one can be a legitimate peripheral participant, even if one has no ride to share, which may lead to an ability to cross the chasm of critical mass.

It is worth commenting that this format of participatory design is quite different from that of the early Scandinavian formulations, which was characterized by direct and lengthy interaction between designers and stakeholders, wherein stakeholders had a broad scope of participation and a greater degree of control over design decisions, with a view to participant empowerment (often in workplaces). This context of travel sharing to address a *tragedy of the commons* problem of pollution and congestion is quite different. Stakeholders are many and varied and their motivations and contexts for participating and using exploratory prototypes are broad. Travelling is but one of many concerns in their lives, and not necessarily a central concern about which they feel oppressed. Communication about travel might only make up a few minutes in their day, (even though travelling may take a lot longer). However,

access to transport or lack thereof does create significant inequity in societies and a lot of taxpayer money is spent on transport systems. Such a problem requires a different format of participatory design. (See Brereton and Buur (2008) for an exploration of new formats of participatory design needed in the era of ubiquitous computing.) Our exploratory method works with a few early participants to understand practices. Participants influence the development of the prototype through their feedback and through their acts of use and non-use. It is admittedly an indirect form of empowerment, however it is a low-cost way to aim to grow participation in sharing travel resources, and the peoples' decisions to participate or not in using the system is the ultimate arbiter of the system success, growth, continuation and resourcing. People vote with their feet and minimal resources are used.

Is it really grass-roots prototyping? Being in a university, the work so far is a collaboration between a Masters student and an academic, with a number of student and academic participants. It is not yet a broad grass roots movement, and results may be influenced by the make-up of the group. However it is quite a departure from a large government commissioned system, wherein requirements are determined in advance with comparatively little participant involvement in the system and problem formulation. Grass roots approaches begin with small local ventures. The approach stands in contrast to a conventional IT approach in which requirements are specified in detail, up front, without a means to test whether they meet people's needs.

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