

RSMG Progress Report 2

Group Co-ordination of Spontaneous Social Activities

Michael Voong

Supervisor: Russell Beale

Thesis Group Members: Dr. Behzad Bordbar and Dr. John A. Bullinaria

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1 Introduction

My research thus far have been in the area of problems associated with designing systems that know about the location of users. These systems can be categorised into two main groups: an assistance to knowledge search, taking into account the context of users; and an assistance to social co-ordination, which uses location data to convenience and to filter social networks or raise awareness of others. Initial reading covered more of the locative information area (reflected in my RSMG Report 1).

The definition of community has been redefined with the advent of location based systems, and now enables a community's collective memory to grow organically, allowing ordinary citizens to embed social knowledge in the new wireless landscape of the city. Terms have been invented to describe these opportunities—including “spacial informatics”, “locative media”, “geoannotation/tagging” and “situated information spaces”.

Emotional awareness systems is a subset of this research, and work on developing ways to bridge spacial distances to connect people. Kuwabara (Kuwabara, Watanabe, Ohguro, Itoh & Maeda 2002) calls this “connectedness oriented communication”, and summarises the characteristics of the systems I am interested in:

“In contrast to traditional content-oriented communication, connectedness-oriented communication does not focus on the reproduction of message contents, but on the social relationships, expected to be formed as a result of communication activities.”

An example of this is the observation that people use IM (instant messaging) for awareness communication, not just for messaging (Dey & de Guzman 2006). It has been found that teenagers feel “left out” of social groups if they are not connected to IM enough.

A journal paper entitled “Social Translucence: An Approach to Designing Systems that Support Social Processes” published in 2000 relates strongly to the trends observed within the past 3–4 years on the web (Erickson & Kellogg 2000); notably the importance for web applications to support interactions amongst people, whereas in the past, content was the “killer application”:

“From our perspective, the digital world appears to be populated by technologies that impose walls between people, rather than by technologies that create windows between them. We suggest that understanding how to design digital systems so that they mesh with human behaviour at the individual and collective levels is of immense importance. By allowing users to see one another, to make inferences about the activities of others, to imitate one another, we believe that digital systems can become environments in which new social forms can be invented, adopted, adapted, and propagated eventually supporting the same sort of social innovation and diversity that can be observed in physically based cultures.”

Erickson argued that digital systems must be more like doors with a window in—we design so that people can see through the translucent window so that they can take in socially salient information, and act accordingly to social norms (i.e. push the door slowly if you see someone on the other side). We can observe this taking effect in an uncountable number of web communities. [Youtube.com](#) allows people to view favorites of other users, which helps you decide on whether you want to track that user’s videos or not. [Digg.com](#) ranks its web links by popularity, helping you decide which links are worth reading. Facebook shows you a user’s activity which, arguably, gives people an idea of the popularity of a person. Recently, *Me.dium* (*Me.dium Official Web Site* n.d.), a browser extension that shows you the people that are viewing similar pages to you and give you a mechanism to initiate a chat with them, shows how it now possible to feel like you’re browsing the web with someone else. Their catchphrase—“being around people changes everything” is similar to what Erickson said in the paper. Even the visualisations used to show co-located presense is the same.

The questions that can be raised here include: what is the best approach for representing social information? Is it a mimetic text-based representation where the real world is represented as accurately as possible (e.g. MUD games), an abstract representation such as a visualisation, or a realistic representation (similar to video conferencing?). The web has restrictions imposed on it due to the method of representation and navigation, but location-aware systems have the potential to redefine interaction and break through these models.

The remainder of the report is organised as follows. Section 2 discusses my literature review in detail, discussing how other designers and researchers have tackled problems related to these types of systems. Section 3 will outline my main research questions in further detail, but instead of being an accurate representation of my final questions, it will be more of an rough indication of my intended research direction. Finally, section 4 looks into my timetable for the coming months leading up to RSMG Report 3 (thesis proposal).

2 Literature Review

The following section will give a more detailed overview of the literature I have looked at regarding location-aware systems. It starts off with giving a theoretical overview of what it means to include the notion of place in a technologically mediated system. An overview of Geotagging will be made, which offers a metadata-led view on linking the real world with URLs. Mobile location-based applications offer convenience and efficiency in common tasks based on specialised communication. Issues of privacy control are given, but is deliberately kept short as it is not within reach of my main interests. Instead, I concentrate on explaining the work done in this period on visualising these systems, giving an idea of the difficult problems encountered. An overview of emotional awareness systems—providing visualisations to help two or more people keep in touch is given, and its relation to location-awareness identified. Sociological theories of group identity are related to awareness systems in the penultimate section. Finally, a consolidated view on all of the above are discussed around the idea of spontaneous group event co-ordinating, which feed into my research questions.

2.1 Theoretical Overview

Theories explored the notion of space in relation to place. The very definition of space lies in physicality, and not on any knowledge associated with it, whereas place is defined by what people understand to be the affordances and uses of a particular space (Harrison & Dourish 1996). Erickson based a project called Babble (Erickson, Smith, Kellogg, Laff, Richards & Bradner 1999) on the recognition of this difference, where ordinary message boards are augmented with indications of usage trails; that is, a visualisation of who has accessed the messages. This was part of a belief that systems should include “translucent social windows” that reveal minimal information; but enough to let users use social knowledge and common sense to make reasonable deductions that help them with their understanding and decision making (Erickson & Kellogg 2000). In short, space is the *opportunity*, and place is the *understood reality*, and locative media realises its power from its ability to disambiguate and solve real-world problems.

I was later attracted to the problems associated with harnessing this locative power in social systems. The potential of such systems reach beyond that of GIS (Global

Information Services) like Google Maps (*Google Maps* n.d.) and NASA Worldwind (*NASA Worldwind* n.d.), as we begin to incorporate *people*. These social systems foster multiple levels of awareness of social context, which brings about major problems in privacy, information visualisation, and bridging the gap between the real and digital world. The subject is vast, and my literature search has been broad as a result. My aim was to build up knowledge in this multi-disciplinary subject as much as possible and feed this understanding into ideas for my research questions.

Gaining knowledge on the theory of location and place have been essential in the early stages of my research. Technological developments have enabled a new class of location-based system that take into account where people are during their everyday lives to improve interaction by linking them to geographical places. Jones (Jones & Grandhi 2005) created a framework which categorised these systems into a grid. He called these systems P3 (people-to-people-to-places) systems, and identified the main problems associated with them. The main categories included were whether the systems were asynchronous or synchronous in their message sending, used absolute or relative location referencing, and whether they were people-centered or place-centered. My literature search included examples from all of the dimensions used in Jones' classification.

2.2 Geotagging

My exploration of the literature naturally continued to reach into the rising popularity of a folksonomy method brought to popularity by the advent of tagging; the foundation of the social web. Folksonomy is a term used for describing the process of collective individuals categorising media using expressive tags. More recently, the term Geotagging is used to refer to the process of tagging locations, usually represented in map form. Many systems use the Google Maps API, which provides an interface for application programmers to search and refer to real locations on earth. Examples of Geotagging systems include the Flickr Geo API, web pages incorporating location metadata using the GeoURL specification (*GeoURL Official Website* n.d.). The hyperlink model of the web was never designed for linking to physical space, so standards have been built above it. Advantages of Geotagging are immediately apparent—we can immediately relate the real world to information, and searching for location-specific information becomes as easy as indicating a given area and providing search criteria.

Some systems exist that enable people to put “virtual post-it notes” on the world. Included are Stick-e Notes (Pascoe 1997), GeoNotes (Espinoza, Persson, Sandin, Nyström, Cacciato & Bylund 2001), Socialight ((Melinger, Bonna, Sharon & SantRam 2004), (*Socialight Official Web Site* n.d.)), ShoutSpace (Cherubini, Dillenbourg & Girardin 2006), Ether-threads (Lassey 2004) and Google Earth Communities (*Google Earth Communities* n.d.). Google Earth Communities is a forum where users can finally discuss things on a local level through one service. Projects of this kind vary in their use, but share the same core concept. More on these types of systems will be discussed later.

2.3 Location-based Mobile Systems

The use of location-based systems can be justified when the mobile context in interaction matters. We can illustrate these justifications by exploring the advantages of mobile devices being aware of their location. A situated user is not only present in the real world but represented by an avatar in a virtual world. The overlay of the virtual world facilitates users in building social bonds in the real world by inter-meshing the two together. For example, a message left for other users at a particular location could be the start of an acquaintance on IM. Compared to traditional communication mechanisms, publishing is instant, and allows the pervasive attachment of context information, given that in place are designed some technological solutions to do so. Different kinds of systems arise, as affordances in communication are directed towards the situated kind.

Examples of location based mobile systems include Socialight (Melinger et al. 2004) and Dodgeball (*Dodgeball Official Web Site* n.d.), two services receiving critical acclaim amongst its growing fan base of users. Socialight can be taken as a social version of Google Earth Communities (*Google Earth Communities* n.d.), where the concept of online social networking websites are combined with information overlaying facilities. The mobile software allows people to leave menu recommendations for restaurants, notes on places of interest for foreign visitors, trails of information which show a representation of the social histories of frequently visited places and more. Dodgeball is similar in that location is important, but is designed to aid social co-ordination. Text messages are sent via a central server to groups of people and special tags are available to indicate current locations. When the central server finds you are in close proximity to friends, an alert is sent, notifying them and suggesting a rendezvous to take place. Here, location is used for convenience, and SMS messaging is used for its expressive power (people label *places*, instead of *spaces*). Absolute GPS co-ordinates would strip away the expressive power that comes with labelling places, for example, “my home”, “our regular café”, etc.

2.4 Visualising These Systems

Additionally, I found that a much larger proportion of location-based systems are based on absolute positioning. There is much scope in exploring the practical nature and real-world effects systems of relative nature. When thinking about these systems in real use, we must cater the visualisation much for the way it is used, and due to the relative immaturity and lack of testing performed on such testing, there is much work to be done on improving these visualisations. Absolute-location based systems can be naturally linked to geographical locations, but what is the best way to visualise relative-positioned systems, where there is no explicit link to places in its labels?

Situated information systems afford in-place communication with world-embedded notes. The kind of visualisation used in these systems are important, and in projects

such as E-graffiti (Burrell & Gay 2002) and GeoNotes (Espinoza et al. 2001), the authors discovered that traditional list-based visualisations inhibited interaction, and users found it difficult to think of the system in terms of its situated restrictions in note publishing. Burrell and Gay hypothesized that this is partly due to the list-based UI being too similar to the communication modalities used in e-mail. InfoRadar (Rantanen, Oulasvirta, Blom, Tiitta & Mäntylä 2004) attempted to combine group and public communication into one interface, arguing that using a natural metaphor of a radar would make much more sense as a representation for situated information. They used a GPS navigation device with orientation detection combined with GPRS mobile data access to implement and carry out tests on a situated information system. Their primary aim was to utilise the full advantages of location-based messaging, rather than inhibit its interaction. It was argued that these systems, bearing their location aspects, should empower people to create relationships with *new people*, as with strong-bond relationships the importance of location diminishes. Paulo (Paulos & Goodman 2004) explored an observation first described in (Milgram 1977) in his essay on the subject that the regular co-occurrence of people in public places increases the chance of recognising others, even if they are not actively aware of it. This notion was named the “familiar stranger”, and can be used to help explain the use affordances arising from shared information spaces for strangers.

2.5 Privacy Control in Social Awareness Systems

Many have observed that recent trends in social network systems have changed peoples’ viewpoints on privacy in the systems. In a survey on privacy views on Facebook (an online social networking website) on an US academic institution, Acquisti found evidence supporting that while realising and solving the problems of privacy control is important, what people think are problems do not transfer into what they allow in reality, given the advantages of computer-mediated social systems (Acquisti & Gross 2006). Automatically providing status information has its problems, and Smith (Smith, Consolvo, Lamarca, Hightower, Scott, Sohn, Hughes, Iachello & Abowd 2005) argues that while at times it may be valuable to infer status information from context and timetabling, explicit communication offers accompanying knowledge of intended context for interpretation. He said that “Understanding denial and restraint strategies for automatic control of location disclosure is paramount to the mass adoption of pervasive technologies”, arguing that the most important problems preventing mass adoption is on privacy control.

Mark Weiser from Xerox PARC theorised about ubiquitous computing (Weiser 1999), and many of the technological issues have been tackled, and are no longer a problem. Salient problems include privacy issues of location disclosure, and many studies have been performed that attempt to identify the main issues that alter the designs possible ((Acquisti & Gross 2006), (Consolvo, Smith, Matthews, LaMarca, Tabert & Powledge 2005), (Price, Adam & Nuseibeh 2005), (Nardi, Schiano & Gumbrecht 2004)). In the literature there is a general agreement that users tend to

relax their opinions of privacy as long as the perceived advantages are large enough, and the success of `facebook.com`, a site that has received much criticism over its overly lax default privacy controls mirrors this.

From the observations of these findings I hypothesise that it is becoming increasingly important to concentrate our research efforts not only on solving the privacy issues of social awareness systems, but also to investigate group dynamics that arise with the use of these systems. There have been comparatively less examples of systems of this type used outside of commercial contexts, and plenty of room exists for academic research. However, it is of vital importance that systems designed to leverage social processes need to be tested in *real world scenarios*.

2.6 Seamful Design

Most location-aware systems, such as the ones discussed thus far, assume the reliability of location service connectivity and take lack of connectivity to be erroneous and unexpected behaviour. Conversely, other studies in spacial gaming have concluded that the opposite approach can be advantageous. They argue that sometimes we can design systems that actively display the seams in connectivity as part of the experience. *Treasure* (Barkhuus, Chalmers, Tennent, Hall, Bell, Sherwood & Brown 2005) is a game where players traverse an area of physical space that has coins scattered over a virtual overlay. Communication to the servers holding a representation of the virtual world is via WiFi using a PDA with a visual representation of the map. Players compete with each other to find coins. Finding areas of greater connectivity is considered a primary aspect of the game, and players are challenged to avoid areas of connectivity problems. Steve Benford's research on a mobile game of "catch", implemented using PDAs, GPS and a mixture of virtual and physical runners, showed how he found clever emergent strategies of hidiers choosing to wait in areas of GPS occlusion (Benford, Crabtree, Flintham, Drozd, Anastasi, Paxton, Tandavanitj, Adams & Row-Farr 2006). Both of these projects are just a handful of those that have found positive aspects of connectivity. These systems highlight the potential design considerations required in location-aware systems regarding flaws in technology.

2.7 Emotional Awareness Systems

Time, distance and emotional bandwidth are constraints imposed on people stopping them from keeping in close contact with friends. A class of systems—called emotional awareness system here—aim to make use a combination of network technology (usually the Internet) and fixed (furniture) or unfixed (mobile) visualisations with the aim of making this connection easier to keep.

A categorisation called "connectedness oriented systems" (Kuwabara et al. 2002) has been used for these types of systems. With the widespread availability of broadband communications networks in developed countries; the ability to communicate

instantly with people regardless of geographical location is now an expected provision. IM (instant messenger) systems, like e-mail, are known to be episodic in nature - instant replies are not expected. This contrasts with high-bandwidth rich-media systems such as the telephone, VOIP and video conferencing, where full attention is required. People have never had such a large choice in communication media. This has enabled a phenomena called hyper-awareness ((Ling & Yttri 1999), (Farnham & Keyani 2006)) where it is common for a select few social bonds to be constantly updating each other with their activities. Hyper-awareness, however, is obviously only possible between a very limited few people in a person's social web due to limited emotional bandwidth. As such, we see systems that use low-bandwidth and sometimes mimetic or abstract approaches to communicating status information. The characteristics of these systems are clearly asymmetric to "instant communication" methods, which are designed for rich communication between a few individuals, whereas emotional awareness systems have the potential to communicate between many.

Some projects have chosen to take a mimetic approach, transferring only several bits of information between small groups of people ((Dey & de Guzman 2006), (Williams, Farnham & Counts 2006), (Holmquist, Falk & Wigström 1999)). Relating to the categorisations of absolute and relative positioning location systems, we may generalise the idea of location into context. This makes emotional awareness systems relative context-transferring as we are not dealing with complete locations, but an awareness on a different dimension.

Ambient virtual co-presence (Ito & Okabe 2005) is a term used to describe maintaining a continuous social awareness with others. Some systems use "buddy lists" to convey awareness information between people. Examples of these include Active Badge (Want, Hopper, Falcão & Gibbons 1992), StudioBRIDGE (Yee & Park 2005) in addition to most IM programs that have basic status information sharing features (e.g. away or busy statuses). The basic idea is that availability information can easily be updated and shared, providing that the required contacts are known to the system.

An example of a mimetic approach is (Kaye, Levitt, Nevins, Golden & Schmitt 2005), where one bit at a time is transferred, with its interpretation being customisable and arbitrary. Kaye found that even one bit information can foster increased feelings of awareness between two people in a long-distance relationship.

Abstract representations designed to be viewed in the peripheral include Babble (Erickson et al. 1999) which provides additional message history and awareness of who is interested in the thread, visualising additional contextual cues. Other projects, Buddy Beads (Kikin-Gil 2006) and Nokia's SLAM (Williams et al. 2006) have group members wear a bracelet, allowing them to communicate via symbolic cues such as L.E.D lighting patterns/vibrations. WatchMe (Marmasse, Schmandt & Spectre 2004) is a personal communicator in wristwatch form, and tracks a user's status as a function of location (via GPS), acceleration and speech activity. An iconic representation of a face is the resulting visualisation, and takes its inspiration directly from the popular emoticon concept. Looking towards projects on the web, Me.dium (*Me.dium Official*

Web Site n.d.) places its importance on people, with the motivation that “people around you changes everything”. Using ideas not too dissimilar to Erickson’s social translucence concept, this web browser plug-in uses proprietary algorithms to show you people looking at similar pages to you. The core concept is that co-matching trails means similar tasks are being performed by those people. The plug-in includes a sidebar that shows a radar-like visualisation of avatars of people browsing similar pages, and allows chatting to them in a message board created specifically for your browsing trail context. An example of its use is the following—imagine you are searching for a home cinema system, using websites ranging from manufacturer websites to price comparison services. Knowing about other people searching for similar things has the potential to widen your search without having to do any additional work.

Twitter (*Twitter Official Web Site* n.d.), Facebook (*Facebook.com About Page* n.d.) and Jaiku (*Jaiku Official Page* n.d.) take a different approach of content aggregation/announcing, which more matches the visualisation expectations of the web. Similar to the principle behind aggregated RSS feeds, status information is consolidated into list form (usually ordered by date), and mechanisms are available for users to subscribe to such information. The primary filtering method is the social network, meaning that hyper-awareness (Ling & Yttri 1999) of the social group is experienced provided users update the system regularly and accurately. Arguments against this method of maintaining awareness of friends include the fact that users cannot be expected to update their status constantly and in sufficient detail. Facebook works because its mass adoption and success in harnessing the exponential, recommendation and social pressure-led aspects of the network effect means that people spend a lot of time on the system, relying on it to serve many parts of their social needs (Acquisti & Gross 2006).

2.8 Groups and Social Identity

Work in awareness systems thus far fall into two main groups—communication between peers and communication between groups. Upon commencement of my exploration of the theoretical landscape in relation to group awareness systems, I came across a sociological science study on identifying characteristics of common-identity and common-bond groups (Prentice, Miller & Lightdale 1994). Common-identity groups are groups where its members share a common cause, for example drama clubs or film societies. The strength between common-bond groups, however, is largely formed by the degree of which members know, like or feels similar to each other. In common-identity groups, attachment to the group is much more important than to its members. Conversely, members of common-bond groups feel more attachment to its members than the group. Prentice carried out a study of third and fourth year students at Princeton University—a group of people where over 85% dine and socialise at specially designed, privately run eating clubs. He compared the results of questions designed to measure the average attachment to both the group and its members for the two types of eating clubs; a) common-bond club (bicker-required

selective entrance requirement) and b) common-identity (non-selective entrance requirement). He observed the asymmetry in attachment to groups and members between common-bond groups and common-identity groups. In a second study that focused on more diverse members of the university Prentice found that using discriminant analysis it was possible to classify 77% of the respondents of the nine questions into the correct group.

These theories of the link between common-identity and common-bond groups showed me the importance of realising the essential differences between them, and a firm understanding would be required in the design of systems that work between groups.

With the advent of new systems that make networked information between people in groups readily accessible, it would be interesting to try and evaluate the hypothesis that the line between group attachment and member attachment groups are blurred. For example, on Facebook, users can create general interest groups that people can join (subject to optional entrance requirements such as being at the right institution). These sites actively promote the existence of these dynamic groups. From this, we can hypothesise that technologically-mediated communities increase the relative importance of the group compared to member attachment. More than a decade later, have things changed?

2.9 Co-ordinating Social Activity

The problem of co-ordinating social meetings amongst many people has been looked into in (Dearman, Hawkey & Inkpen 2005). A task was carried out by participants of the study with three variations—with a mobile phone, with a location-aware handheld, and with both. The strengths and limitations of location-aware devices became apparent; as users were found to be spending time on social protocols such as initiating and continuing verbal communication, whereas with the location-aware systems afforded more concise solutions. This result was backed up by (Cherubini et al. 2006) who found that specialised communication, supposing an interaction design built specifically to afford map annotations used in messaging context, results in more efficient co-operation between users.

Looking at the literature shows that there has been little work to find out what exactly are the sociological implications of co-ordinating spontaneous social activity using location-aware systems. A study (Farnham, Kelly, Portnoy & Schwartz 2004) found that people chose to communicate face-to-face or by phone 58% of the time. The age group in this study averaged at 30, and an interesting study would be to try and verify the validity of this result in a much larger scale, possibly with a lower age group demographic. This lower age group of 16–28 can be empirically observed to be the prime users of event planning features in online social software such as Facebook. As they are arguably the largest group of users that use social software regularly, we would expect to see much less face-to-face and phone communication being used to co-ordinate activities. Inviting users becomes simple, as the user's social network is already there; and the system makes it trivial to restrict invites to certain groups.

However, such social planning systems do not automatically take into account the location of users, and the co-ordinating of the exact event plan amongst large groups of people. Therefore, there is much scope for polling applications which consolidate opinions of large groups of participants and non-participants.

2.10 Summary

We can summarise the patterns emerging from the types of systems mentioned in the literature review. Popular systems account to the real world interaction aspect to be of utmost importance. Problems with automatic disclosure of information means that explicit indication is the preferred method, but user adoption depends on the careful balance between perceived advantages of advertising one's status, and the effort required to perform the updating. The interesting questions arise when we start to explore how linking to the real world allows us to compare the interaction between virtual social networks to real ones. Looking into group theory we find that the distinctions between common-identity groups and common-bond groups, but there has yet to be work performed to confirm this distinction with the advent of the new social web model and location technology. Group communication is now highly convenient, and the effect on group identity is still to be explored in further detail. Finally, the aggregation of opinions of large groups of people in spontaneous social event planning is an area that has tremendous scope.

3 Research Questions

From the literature review I have identified some key questions. They are the following:

On Location-based Group Co-ordination: How can we measure the efficiency of spontaneous group event co-ordination that use context information (location, time, activity, etc.) over traditional methods (phone; email; face-to-face; and more recently, Facebook)

On Group Identity: Do the results from Prentice's work regarding group identity still hold with the advent and mass adoption of new location-enhanced social technologies? Would we still observe the asymmetry in attachment to members and the group between common-bond and common-identity groups? Do new technologically-mediated communities increase the relative importance of the group compared to member attachment?

On Expressive Location Descriptive Power: To what extent do the advantages of allowing expressive tags to be used to label locations meaningful to certain groups, and by allowing them how do we ensure accurate mappings to the real world. Furthermore, do we even need an accurate mapping? Would it be better to use relative references?

On Visualising: What is the best way to visualise social co-ordination systems (of groups) built on an aggregation of social activity, position in a social network, context and event preferences?

4 Timetable for Completing Thesis Proposal

At this point I believe that I am aware of the main researchers, institutions, and systems based around the concept of utilising location to aid in social processes. Furthermore, I have identified several interesting areas to explore further, including the sociological and psychological theories of group identity and on visualising relative location-based communication systems

My next steps are to focus down on the rough research questions outlined in the previous section, and design experiments I could perform. The production of the thesis proposal can be split into the following tasks:

1. Identify and narrow core research questions (May)
2. Consider experiments to perform that may answer my main research question (June)
3. Write thesis proposal (June - 27th August)

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