

# Potential Effects of Ubiquitous Computing on Civic Engagement

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## ABSTRACT

In this workshop position paper, we examine some negative as well as some positive trends in ubicomp with respect to civic engagement. We also describe some critical questions for stimulating the direction of research in this area.

## INTRODUCTION

*“We can almost always tell if a change will bring good or bad tidings. Certain things we definitely do not want, like the television and the radio. They would destroy our visiting practices. We would stay at home with the television or radio rather than meet with other people. The visiting practices are important because of the closeness of the people. How can we care for the neighbor if we do not visit them or know what is going on in their lives?”*

--Amish Interviewee, in the book *Bowling Alone*

In his book *Bowling Alone* [7], Putnam described three ways in which technology and mass media can have negative consequences on civic participation and social capital. These include (1) going from being a source of information to simple entertainment, (2) loss of emotional meaning of message in text, and (3) creation of narrow focus groups that only talk about things of interest to them and never branch out. What is interesting here is that these issues are at the heart of this workshop: ubiquitous technologies that, on the one hand has some positive social benefits, but on the other, promotes many negative ones as well, such as feelings of isolation and depression. This leads to a rather unsettling question, which is, what if the ubicomp technologies we as a community are developing fosters a further reduction in civic participation in the public sphere?

The goal of this position paper is to look at this issue of ubicomp and civic participation. On the surface, it is not immediately clear how the proliferation of wireless networking, sensors, and devices of all form factors might affect public participation. Are there ways we can more easily identify potentially isolating technologies, before they are deployed? We outline a few trends in ubicomp technologies that we believe are headed in this direction. Perhaps more important to ask here is the converse of the previous question, that is, are there compelling ubicomp systems that have the potential for fostering civic

participation? Here, we sketch out a few systems that we believe may have such positive benefits. We also describe Whisper, a web-based and mobile system we have developed for helping people find and coordinate public community events like concerts, sporting events, and neighborhood fairs. We close with some critical questions for ubiquitous computing and civic engagement.

## POTENTIALLY NEGATIVE TRENDS IN UBICOMP

Here, we outline some ubiquitous computing trends that we believe may have negative impact on civic engagement. Many of the claims here are quite broad and are not meant as blanket statements against these technologies, but rather guideposts signifying rough trends in where we might be heading.

### *Home Entertainment Systems*

The rapidly decreasing cost of high-quality televisions and flatscreen LCDs, stereo equipment, and DVD players is making it easier for average consumers to purchase home entertainment systems that rival the experience of going to a movie theater. Video game systems are also an important factor. According to the National Institute on Media and the Family, there are 108 million people over the age of 13 in the United States playing video games today, with 13 million of those considered “hard-core,” people who spend upward of 15 hours a week playing these games [4].

While fun and entertaining, these kinds of home entertainment systems also greatly lower the barriers to cheap and easy entertainment, making “staying at home” the path of least resistance. It is likely that this trend will continue as more and more digital lifestyle systems and smart home systems are developed and become inexpensive enough for average home owners to purchase, reducing the chance of serendipitous encounters, reducing general awareness of one’s local surroundings, and limiting opportunities for meeting new people. They also replace face-to-face communication with simply watching television, making it difficult to develop communication skills, strengthen bonds with others, and meet people with differing viewpoints.

### *Mobile Entertainment Systems*

Another trend in ubiquitous computing is the large number of mobile entertainment systems, including such things as ipods, and games on mobile phones. These kinds of systems make it easier for individuals to limit or even avoid contact with others while away from home and work, as well as closing off awareness with one's present surroundings.

### **POTENTIALLY POSITIVE TRENDS IN UBICOMP**

While some technologies may promote negative trends, others may have a positive impact on public participation and engagement with others. Here, we outline some ubiquitous computing trends that we believe may have such an impact.

#### *Widespread Wireless Networking*

In his book *The Great Good Place* [5], Oldenburg describes a decline in civic participation due to the increasing disappearance of what he calls *third places*, informal gathering places where people can meet and relax (and where the first place is the home and second work). However, the decreasing cost of laptop computers and increasing availability of wireless networking has the potential to alter this trend. Freedom from the physical constraints of desktop computers empowers people to choose to work in more comfortable atmospheres.

For example, many students are taking advantage of campus wide wireless networking at Carnegie Mellon by shunning traditional computer labs, instead choosing to work in spacious atriums, cozy cafes, and local coffee shops. On a larger scale, open WiFi access points and monthly wireless access plans are slowly making this kind of freedom available in several metropolitan areas. Nowadays, it is not uncommon to go to a café and see many people with open laptops. There has also been research in creating software that supports people in physical proximity to one another. For example, HereNow is a project at Microsoft Research that lets people using the same WiFi access point message and share files with one another.

The upshot of all this is an increased potential for socialization and serendipitous encounters with others, which is beneficial for fostering a sense of community and civic participation.

#### *Location-based and Proximity-Based Services*

Geocaching [1] is becoming an increasingly popular game, with a google search on "geocaching" yielding 1.7 million hits. The basic idea is that people and organizations setup caches all over the world and publish the latitude and longitude coordinates online so that others can find these caches using GPS devices. These caches range from physical containers holding small trinkets (where you can take something if you leave something) to virtual caches that reveal beautiful scenery.

An interesting proximity-based service is NeighborNode [2]. NeighborNode associates group message boards to wireless access points, so everyone within the range of that

access point has access to the board and can read and post to it. Rather than requiring absolute location information, one only needs to be able to detect proximity to a wireless access point to be able to participate in the NeighborNode forum. Since this is meant to be a neighborhood communication forum, NeighborNode can be used to engage citizens in taking care of their surroundings, starting neighborhood watch programs, creating a forum for commerce (local yard sales), trade services, share expertise, find common interests, develop bonds, and so on. This technology is useful not for the technology itself but for the human capabilities that it enables.

The main point here is that location-based and proximity-based services can help embed data and interaction within specific and localized contexts, helping to foster new kinds of communities and ongoing social interactions that simply could not have existed before.

### **WHISPER EVENT SERVICE**

We are currently developing Whisper, an *event service* that facilitates finding and organizing outings to events. A common problem everybody has is finding useful and interesting events to go to. These might include street fairs, garage sales, and block parties, as well as public lectures by famous scientists, concerts by popular singers, and book signings by respected authors. Sometimes, choosing to go to an event is a spontaneous, spur of the moment decision. Other times, these decisions are coordinated days in advance with many friends. However, a fundamental difficulty here is in knowing that these interesting events exist in the first place. There are simply too many sources of information to sift through, on top of the information overload that many of us are already experiencing.

From an end-user perspective, Whisper is intended to provide three things: synthesis, serendipity, and spontaneity. By *synthesis*, we mean that Whisper aggregates events from a variety of public web sites, geocodes them with location information where possible, and automatically organizes them into uniform categories such as "movie" or "concert". End-users can then browse through and search for events through a web-based interface. By *serendipity*, we mean that events are filtered and prioritized to make it easier for individuals to find "interesting" events. Filtering and prioritizing is done through standing keyword searches (e.g., any event pertaining to "garage sale", or any event about "privacy" such as talks on privacy) as well as having end-users specify what kinds of event categories they are interested in (e.g., "concerts" and "garage sales"). By *spontaneity*, we mean supporting spur of the moment outings in addition to events planned in advance. Whisper does this by providing a downloadable format so that people can find nearby events on location-enabled mobile devices when out with friends.

We have already begun to do some field work, interviews, and surveys to understand how people manage and organize

events with friends. We have also developed and evaluated three iterations of low-fidelity paper prototypes to get rapid feedback as to what aspects of Whisper people find most interesting. We are currently implementing the first iteration of Whisper, consisting of specialized web crawlers that parse information from pre-specified web sites, a web-based front end for displaying events, as well as a front-end for mobile clients.

We believe that systems like Whisper can lower the barriers to finding and organizing interesting events, increasing the number of people that take part in community fixtures such as symphony orchestras as well as local cafes and bookstores.

### **CRITICAL QUESTIONS FOR UBICOMP & COMMUNITIES**

We have outlined a few negative and positive trends in ubicomp technologies. Here, we draw on these examples and outline some critical questions looking at how ubicomp technologies might be applied to promote community building.

#### *How Else Can Technologies Be Physically Situated?*

Geocaching, NeighborNode, and Whisper were three examples of how ubicomp technologies can be used to physically situate information for encouraging some form of community interaction. Are there other ways of using location-based and proximity-based systems to situate information and interactions, to foster serendipitous encounters or even ongoing socializations?

For example, Paulos and Goodman [6] described designs for supporting interactions between familiar strangers, individuals we regularly observe but do not interact with. Another example is the LoveGety [3], a physical device that facilitates serendipitous encounters by signaling potential dating matches between willing participants. What other kinds of systems are there? What other kinds of ongoing social interactions can be supported?

#### *Are There Better Ways of Achieving Critical Mass?*

One problem common with many groupware and CSCW systems is achieving critical mass with number of users. Are there any social applications that are still useful when they start with only one person? Also, are there strategies for incentivizing people to participate? One approach might be to link participation with games and competition. For example, one could imagine a ubicomp system that measures how “green” a neighborhood is, aggregating how much is recycled (perhaps through weight sensors linked with GPS data) and how clean the local air is. Revealing this kind of data would let a neighborhood see how it ranks with others and gives them a common “enemy” to unite against.

A variant of this problem is achieving critical mass with hardware devices. Can we piggyback off of other technologies that people are already using? For example,

NeighborNode makes use of the ubiquity of WiFi access points, significantly lowering barriers to entry.

#### *Are There Other Technologies That Promote Third Places?*

Earlier, we described wireless networking as a ubicomp technology that promotes third places. Are there other kinds of simple, easily deployable, and sustainable from a business perspective, that can attract people to these third places? Some possibilities include group games that require several people, as well as large sharable displays for facilitating group work. These are electronic devices that are somewhat expensive to purchase or difficult to carry around, but provide significant enough value to people that they would go out to seek them.

#### *How to Manage the Privacy Issues?*

Privacy has always been a fundamental tension in ubiquitous computing. On the one hand, greater knowledge can lead to greater good. On the other hand, this same knowledge can lead to greater harm. What ways are there for maximizing the good while minimizing the potential for harm?

One possibility here is to share aggregated data about physical places while minimizing data about specific individuals. For example, the “green” system described above might reveal data only about entire neighborhoods rather than individuals. As another example, in the seminal paper *The Computer for the Twenty-First Century* [8], Mark Weiser described how Sal maintained awareness of her neighbors:

*Sal looks out her windows at her neighborhood. Sunlight and a fence are visible through one, but through others she sees electronic trails that have been kept for her of neighbors coming and going during the early morning. Privacy conventions and practical data rates prevent displaying video footage, but time markers and electronic tracks on the neighborhood map let Sal feel cozy in her street.*

### **CONCLUSION**

Community building ranges from strengthening the bonds between friends to bringing like minded strangers together to exchange ideas and create bonds. Strengthening friendship bonds can range from helping coordinate their activities to spending more time together, sharing ideas, and keeping each other in their thoughts, to silly games where they can let their hair down. Bringing strangers together can be based on common interests (i.e. fishing, politics, vegetarianism, etc) or common activities such as going to the same coffee shop.

The main question for our research community is how we can understand how the ubicomp systems we are developing can affect community building, and in the long-term, strengthen these bonds to increase civic engagement. In this workshop paper, we outlined some trends in ubicomp that might affect civic participation, and posed

some critical questions to stimulate discussion about the direction of ubicomp research.

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