Mobilizing Community Networks

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Abstract
Community networks facilitate the development and management of information and activity in a proximate community. Porting community networks to different hardware platforms, like handheld devices, will afford universal channels of accessibility and enhanced opportunities for collaboration. We argue that mobile community networks offer richer interactions than just desktop-based systems. Mobile community networks afford place-based interactions while users are on the move. They can also facilitate local community growth and build social capital. Mobile community networks will eventually coordinate actions of groups in geographic space and supplement social arenas. In support of our arguments, we follow a scenario-based design process and surmise that conflating mobile technologies and community networks will create a new paradigm in community computing.

1. Introduction

In this position paper, we explore the conflation of mobile technologies and community networks. Ubiquitous computing infrastructures facilitate the integration of learning with experience. *Whenever and wherever* can mean that people learn about a place when they are really interested in it and need to know about it, such as when they're in the proximity of it. This possibility is especially attractive with respect to learning about one's local community, as well as building upon what one knows about one's local community as a rubric and resource for finding and learning about other contextual things (e.g., learning about hydraulics as one walks past a pumping station).

Community networks will likely incorporate pervasive technologies that will lead to a more integrated environment. An analysis of web-based community networks reveals that the sociality of community behavior can be enhanced by re-conceptualizing the interaction framework and activities that constitutes the network. We conjecture that the addition of mobility to community networks will provide additional channels of communication that go beyond the exchange of information. A sense of place can be conveyed by building models of place into the community network infrastructure, and the potential barriers to participation might be lowered by engendering a framework for learning into the activities of community networks.

2. Design Directions for Community Networks and Mobility

Our arguments for incorporating mobility into community networks are based on the design directions for community networks laid down by Carroll and Rosson. Carroll and Rosson [Carroll and Rosson, 2003] argue that the concept of community networks is in need of analysis and reconstruction. The context for community networks has been transformed by the development of the World Wide Web, network communities, and computer supported cooperative work (CSCW). The authors suggest that sharpening the concept and trajectory of community networks will lead to new possibilities for developing and utilizing community computing.

In their paper, Carroll and Rosson claim that although the Internet makes distribution and access to information convenient, it does so at the cost of weakening the context and attachment provided by places in the community, and thereby reducing the sociality of the exchange. Table 1 depicts the consequences of posting community information on the Internet.

Web-based community information …		
+ flexible, convenient posting and access		
- Web-site directories do not leverage or	➔	Incorporate models of place

strengthen a shared sense of place		
- reading is asocial, invisible, and passive	➔	Integrate communication channels and interactions
- Web browsing and authoring not universally accessible	➔	Incorporate lifelong learning

Table 1: Reasoning from the positive and negative consequences of a community network design feature to generate new design directions (adopted from [Carroll and Rosson, 2003]).

Based on the negative features of web-based community information and the proposed future directions outlined in this table, we probe the incorporation of mobility in community networks and argue that mobile community networks resolve these drawbacks. The following two sections illustrate that mobile community networks:

- Facilitate community growth and build social capital through anytime, anywhere accessibility, and
- Create an innovative, informal learning environment.

3. Community Growth through Anytime, Anywhere Accessibility

In traditional web-based community information, reading is asocial, invisible, and passive. This is certainly true for users accessing information from desktop computers, isolated from the world inside their homes. Reading about local community activities might evoke a reaction on the reader's part; however, the most that can be achieved by sitting at home is to post an opinion on a web page and/or remember the issue for bringing it up for discussion in the later presence of others' company. Community networks are all about the community, its people, events, places, etc. Local people like the person across your street, events like a community fund-raiser, and places like a popular coffee shop in town engender an interactive and integrated community network.

A mobile community network liberates users from confinement to places where desktop computers are required to access community networks. Users should not have to move to a specific place to access community networks—this simply binds them to a pure online interaction medium. An enriched communication medium would be a combination of both online (through the Internet) and offline (through physical meetings) interactions. Community networks should not put the user in their pocket and lock them from the outside physical world; rather, the user should be able to put a community network in his/her pocket, and interact with it anytime and anywhere in co-presence of physical factors such as people, events, and places.

Take the example of a local coffee shop that acts as a social place, where issues such as politics may be discussed by the same group of people in the same corner every Sunday afternoon. Consider the following scenario:

Eddie, while sitting at the coffee shop with his friends, starts discussing the water shortage problem in the town and the Mayor's request to drastically conserve water to avoid a drought. Cedric retaliates by claiming that his plants need regular watering and he cannot conform to the request, which leads to a debate amongst the local crowd. Eddie, observing the havoc over the water conservation issue, takes out his PDA, browses the local community network, and clicks on the "Water Shortage" link. He ends up finding pointers to conserving water and how to use dehumidifiers for watering plants. Eddie informs his friends who then follow his lead and read over the details.

This scenario demonstrates how a local mobile community network leads to a positive discussion towards achieving a common community-oriented goal among the people. If the community network was inaccessible from wireless and mobile devices, chances are that the debate would have remained unresolved, relationships between people would have weakened, and perhaps the recurring meeting between this group of people over a cup of coffee would have not taken place again, thereby hampering the social capital that was being built by this informal setting. Having access to the mobile community network anytime and anywhere facilitated the debate in a positive manner, resolved the issue at hand, and promoted the shared communitarian goal of conserving water.

We believe that incorporating mobility into community network infrastructures can make unique contributions to *social capital formation*. People often have constructive, community-oriented thoughts as they confront and respond to social situations in the course of daily life. For example, in Blacksburg, the crosswalk on Main Street is poorly marked, and as a result, a car there could possibly hit someone. This is salient to a driver right after he/she nearly hit someone or gets hit. With mobile access to the community network, the driver or the pedestrian can post the issue before reaching the destination when the thought might be repressed. This could increase responsibility in community life, which raises social capital.

4. Learning through a Mobile Community Network

Networked computers and corresponding applications facilitate distributed education with the mediation of learning activities by a constellation of various tools (such as shared spaces, whiteboards, etc) having appropriate pedagogical approaches to collaboration and social interactions [Fjuk and Smørdal, 2001]. At the same time, mobility, flexibility and instant access of handheld devices add considerable freedom for people to collaborate anywhere, anytime [Soloway et al., 2001]. However, not enough research has been done in integrating the two concepts; for example, trying to coordinate the use of desktop computers and handheld devices in a community-oriented fashion to facilitate education. In this section, we propose the concept of mobile education, which is a new way of using wireless and mobile technologies for education by extending access from a desktop-based community-oriented environment such as MOOsburg [Carroll et al., 2000] to handheld devices used as part of a mobile community network.

One of the target applications for MOOsburg is an ongoing community project called Save Our Streams (http://www.iwla.org/SOS/). Save Our Streams is a national watershed education and outreach program that uses hands-on activities, such as cleaning up stream corridors and monitoring stream health, to help restore watersheds. Through these activities, community members learn about the importance of protecting their local watershed and become more educated about the environmental, economic, recreational, and public health benefits of clean water. The national Save Our Streams program consists of over 300 local chapters that coordinate activities for their local citizens. One of the major activities is an assessment of the stream's health through biological sampling, such as insect counts. Participants on such trips learn about stream ecology and how to assess water quality. The data collected on these outings are often provided to the local and state government to augment their knowledge of the stream's condition.

Currently, the local Save Our Streams project conducts biological sampling at seven distinct locations. We have modeled each of these locations in MOOsburg, such that all of the data related to a particular site is available online. Through the use of synchronous and asynchronous chat tools, Save Our Stream leaders as well as other community members, can discuss interesting findings such as the overall condition of the local stream.

In organizing an educational trip to the stream, Save Our Stream leaders want to engage people in hands-on activities and informative discussions about the local watershed. One way to encourage learning in this setting is to compare data collection results, explore trends, and communicate with other stream experts. Upstream activities affect downstream collection results and a stream can change over time. Accessing previous data while adjacent to the stream can foster an educational discussion of these properties and encourage participants to learn about what affects a stream's health. Also, communicating with other stream experts not on the trip can provide additional insight. These features are available through MOOsburg, yet they are not readily available in the field when people are learning. A mobile community network would fulfill the requirements of learning in the field. Consider the following scenario.

While training a couple of community members on how to conduct a Save Our Streams trip, Julie notices that the stream area they are visiting could use some improvement. She uses this opportunity to discuss these issues with the trainees and introduce the online virtual community. One of the issues raised concerns about the large amount of trash that is nearby. Unfortunately, Julie did not bring any supplies, such as garbage bags and gloves, to address this problem. The group also notices that the stream lacks shade and that planting some small bushes could be an easy solution. Julie does not want to have to remember these suggestions for the next visit, so she shows the group how to use their handheld devices to share their idea with others in the Save Our Stream community. Save Our Stream leaders often check with this online environment before going on a field visit so that they can see what has happened there recently.

Shortly after they post their ideas, a new message appears from another stream expert. Apparently, he will be visiting this area soon with a local youth group and will be able to make the improvements.

This scenario demonstrates the usefulness of MOOsburg both in the field and in an inside setting using a traditional desktop computer. Providing access in both locations allows the collaborators to continue their communication despite their physical location. It also allows them to exchange ideas in a timely fashion and not wait until they have access to a desktop computer.

Supporting these interactions in the field adds new dimensions to the educational experience. In this example, the trainees quickly learned about the network of stream experts that they would be joining. They learned about how the larger group works together and discusses various issues concerning the watershed. Similarly, a group of college students could have benefited from a synchronous exchange with another stream expert. Possibly this person could not join the trip but they offer additional knowledge about the stream. Having access to MOOsburg through both handheld devices and desktops makes these collaborations possible.

Our premise of mobile education is based on the idea by Pascoe et al. [Pascoe et al., 2000]: "Using While Moving", which is the basic ability fieldwork users require of a mobile computer system. Mobile education encourages distributed peer collaboration over wireless devices and desktop computers to create opportunities for discovery and education in the field and community. It is a novel approach that will use a community network to facilitate the learning activities of teachers, students, and peers through collaboration in a distributed environment. Mobile education is significantly different from existing mobile learning systems in that it leverages its collaborative activities from an existing desktop-based community-oriented environment (MOOsburg), and thus offers a range of collaboration opportunities, such as synchronous and asynchronous interactions with peers, and viewing or changes to persistent data. This will enable users who are interacting from either handheld devices or desktop computers to merge their learning experiences in a shared collaborative environment, both synchronously and asynchronously, with reference to the same underlying data. The implication of mobile education is that teachers, students, and peers in a distributed field environment can interact seamlessly with their counterparts in a desktop environment using a community network.

5. Conclusion

Most learning takes place outside the classroom. People continually learn through their participation with others in everyday activities. Such learning is important in contemporary society because formal education cannot prepare people for a world that changes rapidly and continually. Mobile community networks can unveil a range of opportunities for users as mobility offers real-time experience of places with simultaneous online access to the web of information and services on the community network. Community-owned wireless networks are gaining popularity and could help bridge the digital divide [Jonietz, 2001]. In this paper, we articulated arguments in an initial scenario-based analysis for exploring mobile community networks, and hope that researchers in the arena of community computing and mobile technologies can realize this vision.

References

Carroll, J.M., Rosson, M.B., Isenhour, P.L., Van Metre, C.A., Schafer, W.A. and Ganoe, C.H. 2000. MOOsburg: Supplementing a real community with a virtual community. In *Proceedings of the Second International Network Conference: INC 2000*. pp. 307-316. Plymouth, UK: University of Plymouth/Internet Research.

Carroll, J.M. and Rosson, M.B. 2003. A trajectory for community networks. *The Information Society*. In Press.

Fjuk, A. and Smørdal, O. 2001. Networked Computers' Incorporated Role in Collaborative Learning. *Proceedings of CSCL*.

Jonietz, E. 2001. Unwiring the Web. *Technology Review*. December, 2001.

Pascoe, J., Ryan, N., and Morse, D. 2000. Using While Moving: HCI Issues in Fieldwork Environments. *ACM Transactions on Computer-Human Interaction*, Vol. 7, No. 3, September 2000, Pages 417-437.

Soloway, E., Norris, C., Blumenfeld, P., Fisherman, B., Krajcik, J., and Marx, R. 2001. Handheld Devices are Ready-at-Hand. *Communications of the ACM*, 44 (6), pp. 15-20.