MoCoMapps – An Experiment in Crowdsourcing both Data and Applications for Mobile Services

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ABSTRACT
We describe an experiment in crowdsourcing both map-based data and also the applications that provide the maps, and we present three scenarios of use.

Author Keywords
Mobile, location-based services, crowdsourcing, map, geowiki, collaboration, participatory urbanism

ACM Classification Keywords
H5.3. Group and Organization interfaces.

INTRODUCTION
In this position paper, we describe an experiment in mobile crowdsourcing by ordinary users called MoCoMapps, for **Mo**bile **Co**llaborative **M**ap-based **App**lication**s**. The goal of the project is to provide a mobile service for both *using* and *creating* mobile map-based applications for (e.g., for data entry, data look-up, and collaboration). The shape of each application will reflect the goals and needs of its creator. Our intended user group is ordinary citizens, business users, government employees, and non-governmental organization (NGO) workers. Therefore, we are designing to support non-programmers as both end-users and application-creators.

BACKGROUND
Our experiment is informed by earlier location-focused work. The Cyclopath project used a geowiki [11] in the form of a map-based application for collaborative reporting of bicycle routes and local conditions in a North America city. Studies of Cyclopath have shown how users collaborate to describe routes and to update the road configurations that affect bicycle travel, and how users have employed social features for collaborative construction of their shared resources [11].

Some citizen science projects have also provided map-based methods for ordinary people to contribute data (e.g., [2]) and in some cases to obtain datasets contributed by themselves and other participants (for review, see [14]). In general, these efforts are led by professional scientists, who specify a set of protocols for data-entry by lay-people.

Palen and colleagues have explored the use of social media during emergencies in USA, Haiti, and Chile in Project EPIC [8]. They have begun to develop tools to formalize the reporting of emergency situations into categories, and to organize the dispatch of aid workers [13]. In some ways, their approach has a more complex data model than Cyclopath and citizen science projects, because they can

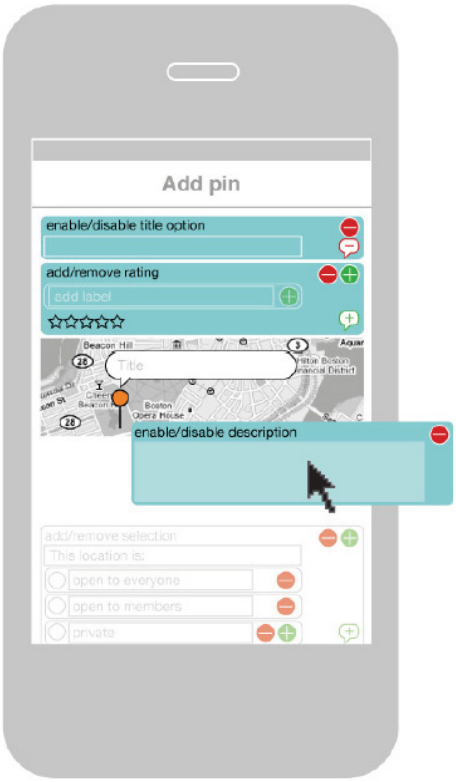

figure 1. Creating a mini-app in MoCoMapps, using a forms-based approach.

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represent *multiple* types of problems, (e.g., different symptoms of oil spill contamination in the Gulf of Mexico); however, their approach does not include the collaborative problem-solving capabilities of Cyclopath. In related research, Mark and colleagues have studied the use of communications technologies to strengthen the *resilience* of a community during a long-term or on-going disruption [4]. These efforts are now being combined into a vision for public action during emergencies [7].

People may have other concerns about their local towns and cities that are not related to bicycle routes, citizen science, or major emergencies and disruptions. A number of municipal services based on standards or concepts from Open311 [6] have been used to support citizen-reporting of local problems in many cities, including the Fix My Street service in Commonwealth countries [1], Mark-a-Spot [5] in Germany, and See Click Fix [9] in USA.[1] Some of these services have focused on diverse methods of contact to reach as many people as possible (e.g., [12]). Others have included additional features for citizen engagement (e.g., [5]). Research reports are just beginning to appear from these efforts, demonstrating large-scale usage and also problems in coordinating and publicizing responses from local governments (e.g., [3]).

Each of these services is limited to the features required to support a distinct purpose and domain. Cyclopath serves the navigation needs of cyclists, primarily using data fields for that domain. Citizen science projects currently require a precise set of data fields in order to aggregate scientifically useful data. The work of Palen's group requires a pre-specified hash-tag grammar of emergency conditions [10]. The Open311 applications generally assign citizen reports into pre-specified categories of urban problems. None of these services can be used to create a new type of data field, or a new topic of interaction.

MOCOMAPPS

But what if a user wants to define new data categories, or entirely new map-based services? We designed our MoCoMapps project to enable ordinary people to innovate their own map-based applications, and to share them with others. We also designed a way to combine data from multiple applications in a single display.

MoCoMapps Components

Creation Environment. MoCoMapps provides a forms-based, drag-and-drop method for designing a map-based collaborative application (Figure 1). We have assumed that the primary goal is to record user-provided data points at locations on a map (e.g., data about businesses, events,

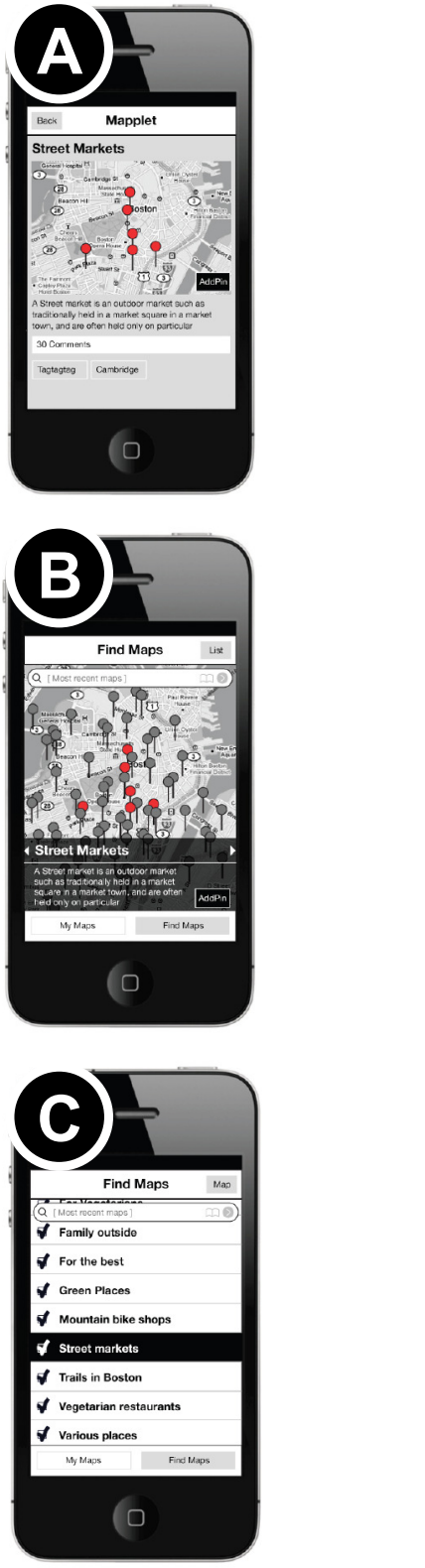

figure 2. MoCoMapps Client. A. A single mini-app. B. Multiple mini-apps (differentiated by color). C. Choosing which mini-apps to display.

[1] These projects are a very small subset of the large number of geowiki projects at in the Open311 wiki [6].

ratings, and other observations).[2] The specific types of data points are designed by the creator of the application, using simple menu selections. When the creator has completed the design, then a single operation publishes the application for use as a mini-application ("mini-app") that runs within the MoCoMapps client environment.

Mobile Client. The MoCoMapps client is a mobile application Figure 2). Once a user has downloaded the client, s/he may access one (Figure 2A) or more (Figure 2B) mini-apps. The user may search and download mini-apps using keywords in their titles or descriptions. (Subsequent versions will explore social mechanisms, such as recommendations, social filtering algorithms, and tags.)

Once a user has downloaded a mini-app, then s/he can add data points at locations on the map, according to the data fields that were specified by the mini-app creator. If the mini-app creator included a *ratings* field or a *comments* field, then the user can also provide ratings or leave textual comments regarding data points that were contributed by other users. If the user has downloaded *more than one* mini-app, s/he can choose to view a single mini-app at a time, or a combination of mini-apps in the same display (Figure 2B). In this way, users can perform the equivalent of a mash-up of data points from multiple mini-apps by simple checkboxes (Figure 2C).

Future components will support role-based permissions for user actions, back-end data access and query composition, including end-user downloads of all or selected portions of contributed data (as permitted by the creator of the mini-app).

Scenarios of Use

Consumer/Recreational Mini-Apps. We hope that MoCoMapps will become a tool for ordinary citizens to create mini-apps to support activities they share with others, such as maps of ice cream shops, parks that are dog-friendly, clean bathrooms (with a data field to indicate the presence of a changing table for infants), and bookstores. Through the ability to combine mini-apps, these kinds of resources could be used, for example, to plan an afternoon's trip with a dog and a baby.

Emergency Response. Inspired by the work of Palen and Mark and colleagues [4, 7, 10, 13], we envision a set of mini-apps for use during emergencies, such as locations of hospitals and clinics, shelters, food and water, and changing hazards. Some of these mini-apps might be provided and maintained by government agencies (e.g., the location of public shelters). Other mini-apps might be provided by individual users (e.g., road closures or flood levels). We think that emergency response will be strengthened if people can choose which types of emergency information to display together, and can update certain data points themselves, as emergency conditions change.

Citizen Science. Many citizen-science projects are map-based, including IBM's CreekWatch [2]. MoCoMapps provides a means for citizens to contribute data points, for citizens and scientists to visualize those data on a map, and for reporting and extracting of data by participants. Unlike conventional citizen science map-based applications, MoCoMapps will allow users to combine data from multiple projects onto a single display.

CURRENT STATUS

We have been developing the concepts and prototypes of MoCoMapps since summer 2010. We have an operating app-creation environment, and we are currently testing outcomes on smartphone simulators. We anticipate going "live" with real versions of all components sometime during the first half of 2011.

CONCLUSION: CONTRIBUTION TO THE WORKSHOP

For the workshop, we propose to provide details of our project, and to exchange scenarios of use with other groups. We are particularly interested in innovations in how people can collectively create applications, data, and collaborative insights, and in how these new mobile mini-apps can serve people's needs.

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[2] E.g., a public-art mini-app might have menu items about sculptures vs. murals; an ice cream mini-app might have data fields about flavors; a citizen-science mini-app might have user-sourced observations of temperature or snowfall.

[3] URLs were verified as of 12 January 2011.

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