

# Collaborative Mapping in an Infrastructure Independent Network

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## Introduction

The focus of this exploratory research project has been the development of a prototype software application that supports collaborative mapping activities using an infrastructure independent network and mobile phones. The research question is as follows:

Is it possible to provide collaborative mapping services on mobile devices in an infrastructure independent manner?

The primary use case for the prototype application is in the response to a disaster or emergency event, such as the earthquakes in Japan and New Zealand or the floods in Queensland.



Figure 1: Images from the New Zealand earthquake and Queensland floods

## Collaborative Mapping

The prototype application allows users to collaboratively construct a shared body of knowledge on a map.

The application displays the users own location and the location of other users of the application.

Users add incidents to the map, for example marking the location of damage to a bridge or the location of a disaster relief centre. These incidents are then shared with the other users on the network.

## Mobile Devices

The prototype application is intended for use in the field during the response to a disaster or emergency event on a users smartphone. A smartphone provides capabilities such as larger screens, more processing power and most importantly a Global Positioning Systems (GPS) receiver.

The Android operating systems from Google is the chosen development target. Android provides the opportunity to develop a rich user experience and is currently the primary platform supported by the Serval Project software.

## Infrastructure Independent Network

The Serval Project software provides a resilient mesh network that primarily supports voice communication in an infrastructure independent manner. The network can also support data from other applications such as the prototype collaborative mapping application.

Where possible existing infrastructure is used to expand network coverage, but it is not necessary. This is particularly important in a disaster or emergency response situation where the existing telecommunications infrastructure may be damaged or otherwise unavailable.

## Serval Mapping Services Application

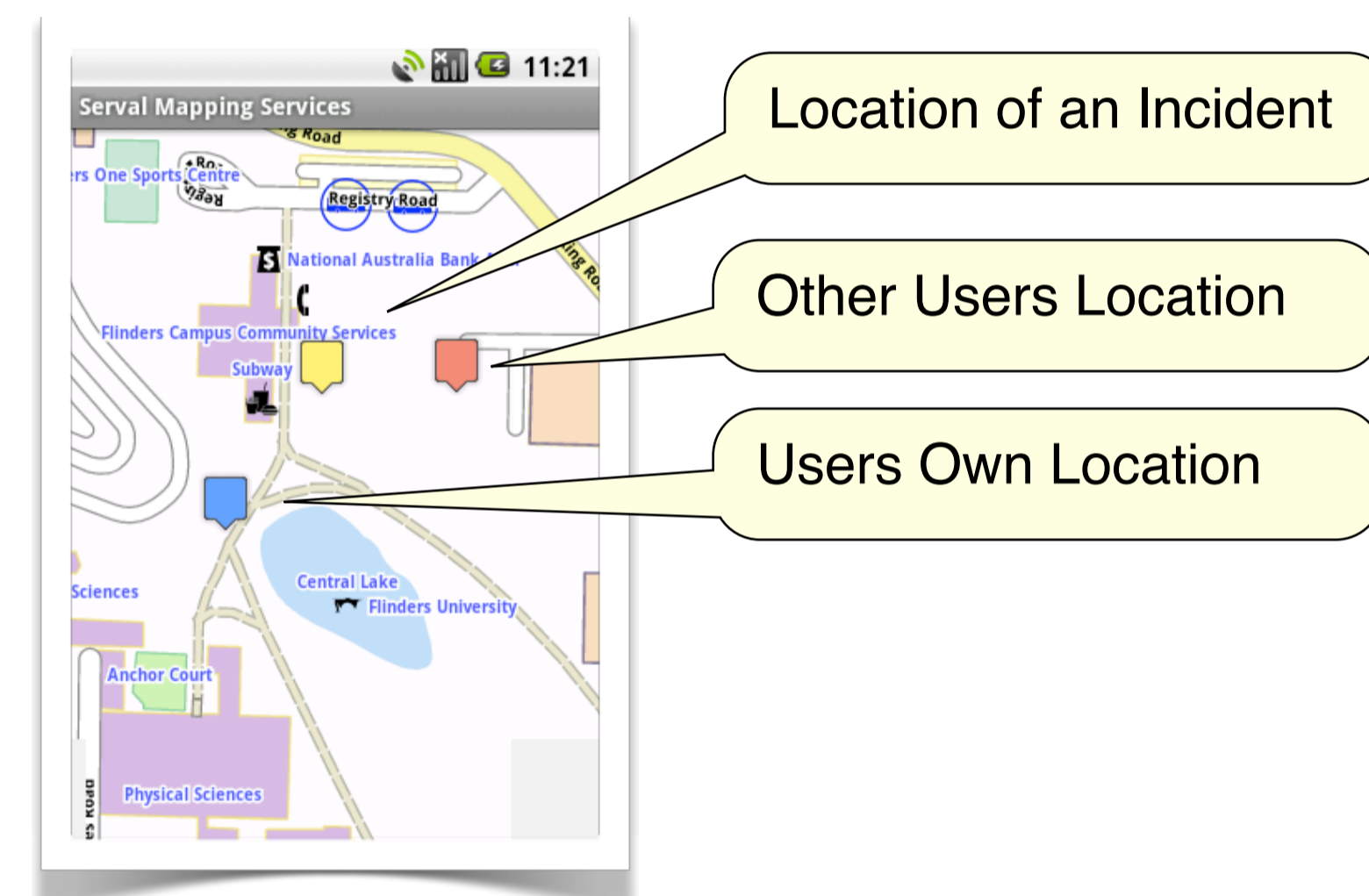


Figure 2: Prototype Application - Map Display

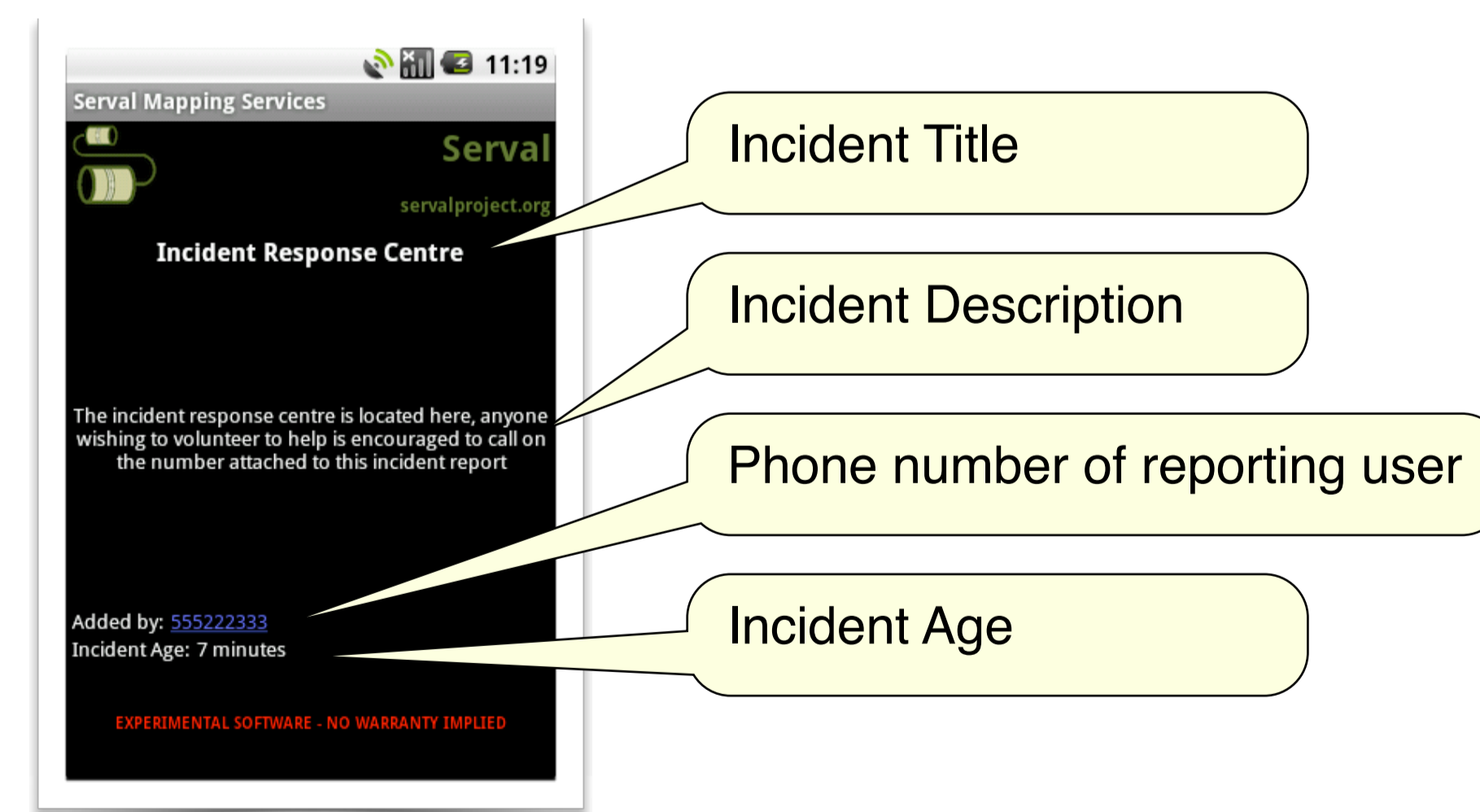


Figure 3: Prototype Application - Incident Display

The prototype application stores map data on the phone sourced from OpenStreetMap to render a map. Therefore a constant internet connection for map information is not required. Incident and location data is replicated across the users mobile phones, there is no single point of control or failure.

A collaborative web based system called Ushahidi provided inspiration for the project. This system has been used widely to crowdsource information during disasters, emergencies or from interested parties. Ushahidi relies on the availability of telecommunications infrastructure. It does provide insight into other use cases for the prototype application.

## Other Use Cases

- Environmental management: cataloguing weed infestations
- Safety and security: cataloguing incidents of harassment

## Further Work

- Larger scale user experience testing
- Incorporating ways of managing authority
- Multiple categories of incidents
- Attaching images and videos to incident reports



Figure 4: A HarassMap supporter in Egypt

## Supervisors

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## References

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- [2] O. Okolloh, "Ushahidi, or 'testimony': Web 2.0 tools for crowdsourcing crisis information," Participatory Learning and Action, vol. 59, pp. 65–70, June 2009.

## Image Credits

Figure 1 - Left: Mark Lincoln (CC-BY-NC-ND) <http://www.nzraw.co.nz>

Figure 1 - Right: Jono Haysom (CC-BY-ND) <http://www.flickr.com/photos/jonohaysom/5348250582/>

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