Location Based Social applications and crowd sourced efforts future role in disaster management scenarios

Presentation for the United Nations/Abdus Salam International Centre for Theoretical Physics Workshop on the Use of Global Navigation Satellite Systems for Scientific Applications

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Location based Social Network (LSBN)

... A social structure made up of individuals connected by the interdependency derived from their locations in the physical world ... a given timestamp and the location history ... [and their] common interests, behavior, and activities
Mobile Crowdsensing Apps

“Mobile crowdsensing applications ...collect and share information about the user or the environment, either interactively or autonomously, towards a common goal.”

Source: IBM
Current Research

• Social Networks Applications (SNA) changes the way people communicate
• GNSS based SNA applications are used for various daily applications: social navigation, mapping; rideshare parking discovery e-commerce etc.
• the common denominator being a resource limited world and a smart ability to share geotagged information
• Search and rescue efforts recently show increase use in SNA+GNSS.
• How could SNA be utilized in crisis management to better respond in future crises?
Timeline of Major Technology – focus on the last 2 years

**Social Networks**
- Facebook
  - 600M -> 1B Users (Jan 2012-> Oct 2012)
- Foursquare
  - 20M users
  - 2B check ins Q1 2012
  - 30M users Q4 2012

**Internet**
- Twitter
  - 230 M users
- Baidu
  - IOC over AP (Dec 2012)
- GLONASS
  - accuracy<2.8m (2012)
- 20% of internet surfing sourced from mobile
- 2012
- 20M users
- 2B check ins Q1 2012
- 30M users Q4 2012

**GNSS**
- 2013
- Baidu
- IOC over AP (Dec 2012)
- GLONASS
  - accuracy<2.8m
- GPS
- 5 in 1 GNSS chip (2013)
- Baidu
- IOC over AP (Dec 2012)

**Mobile & Smartphone**
- Dual GNSS
  - iPhone 4S
- Octa Core
  - Galaxy S4
- ZTE Blade 3.5
  - W/ A-GPS for $140
- iPhone 5S
  - M7
- Android
- Fused
- Location/actvtrec
- HTC 820
  - 1.75M Smartphone users by H1

**2014**
- Snapdragon
- QLQM SNPDRGN 615
- GPS GLNSS Baudu
- February, 2014 (Q3)
- HTC 820
  - 1.75M Smartphone users by H1
- User based mesh networks IOC
Case Study -1
The January 10, 2010 Haiti earthquake

UN Mission Building Port Au Prance
Source: http://news.bbc.co.uk/2/hi/americas/8458690.stm
Introduction

Magnitude 7 earthquake aftershock map

Tent City in Port-au-Prince area

Source: http://www.heartlandalliance.org/international/updates.html
Communication infrastructure

Haiti Earthquake damage map
Source: OpenStreetMap

Damaged communication infrastructures

All Partners Access Network (APAN)

Deployed 24 hours after the earthquake
Source: APAN.org

APAN mobile app announced of February 2011
Source: APAN.org
Mission 4636

Mission 4636: 45,467 massages, 1,200 translators
Source: http://www.search-internetmarketing.com/tag/mobile-services/
Disaster management systems

Ushahidi Report Map: 3584 reports Geotagged
Source: [http://haiti.ushahidi.com/](http://haiti.ushahidi.com/)
Google Crisis Response Team

Google earth images before and after the earthquake

Source: http://www.pcworld.com/article/186897/google_earth_reveals_the_devastation_in_haiti.html

72h IOC 55,000 Records
OpenStreetMap Response team

“Haiti earthquake response mapping project”.
Success stories

A hospital located outside Port au Prince
Source: http://www.tampabay.com

102 (105) Health facilities location within 35h

Israeli search and rescue team in action
Source: http://www.vosizneias.com
Case Study - 2
March 11, 2011 Japan earthquake and tsunami

People wait to be rescued in Kesennuma, Miyagi Prefecture March 12
Introduction

A magnitude 9 earthquake triggering a devastating tsunami

The U.S. Indian Ocean Tsunami Warning System (IOTWS)

Source: http://www.boston.com/
Communication infrastructure

NTTDoCoMo disaster recovery scheme
source: http://www.nttdocomo.com/disaster/index.html

Earthquake’s Impact on Japanese International Bandwidth
Introduction

"While there are so many technologies at this time that isolate us ...social networking tools have shown their ability once again to unify us as human beings”
Online search and rescue efforts

Survivor looking for relative survivors


Google person finder IOC within 4 hours received 7000 request in the first few hours

With overall 600,000 records

Source: http://www.kochiservnet.com/
Disaster management systems

Ushaidi Report Map: 12,317 reports Geotagged

Source: http://www.ushahidi.com/
Facebook Safety check

- On 14 October 2014 FB announced “Facebook Safety Check IOC.
- App recognize your location based on “Nearby friends” - a geo location based service
- Let friends and family know you’re safe
- Check on others in the affected area
- Mark your friends as safe
- Privacy features
The use of Geo-tagged tweets for disaster management – hurricane Sandy (October 22 2012)

Source: ESRI
Collaborative efforts to find MA 370 Boing 777-200

- Plane was announced missing: March 8 2014
- Digital globe imagery were taken on March 9 2014
- Imagery were made available to public using Tomnod, a project owned by DigitalGlobe that uses crowdsourcing to identify objects and places in satellite images
- Relevant networks: Tomnod; Reddit; Tweeter; CNN iReport

What is Tomnod?

On Tomnod, thousands of volunteers (like you!) use satellite images to explore the Earth and solve real-world problems.
Results

• More than 115,000 volunteers joined the efforts (100K/min)
• 100 million page views posted in the first 34h
• 2 million satellite pages/ 10 minutes.
• Site went down after few hours
• Mike Seberger, CNN iReport was the 8\textsuperscript{th} most popular of all-time.
Fire chat – Network less chat

• On the 2014 September protest in Hong Kong, protestors used the Israeli App FireChat to avoid the in availability of the network.
• They were asking for supply and help from each other
• FireChat was proven as the best communication at that given scenario
What and where using Firechat
YEVVO (Yes in Zulu language)

• An in FB like social network that allow free live video streaming for followers on the network
• User Generated video outlet
• Live video through a tweeter feed
• Flashback mode for late update
• When used with geotagged tweets allow users to send geotagged videos
“Meet the Zero characters communication tool"

- 8 hours of prototype development
- 110K Downloads per day (raised 1M$)
- Context based Language-less communication
A new form of Geo location communication is forming

- New Terms to be used:
  - Post Disaster User Experience
  - Adaptive BW services
  - Self deployed networks

- Strong geo location capabilities both in frontend and in backend to identify potential activity/anomaly

- C2C/ B2C services based on location based social/crowd sourced efforts are growing rapidly

- G2C services becomes a big question mark as technology speeds up
The 10-14 December 2013 Alexa storm
The Burma Way – Waze version
Summary

• Location based social media increases the community resilience in resource constrained situations
• Services that are used in every day life will become a life saving tool and a port off call for users in disaster events
• Utilization of location based social media will become a necessity
• GNSS, mobile networks are still critical enablers
• Users become more accessible and thus new terminology is to be addressed
• Governments need to integrate in a changing communication environment
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Thank You!
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