

SPARCCS

Smartphone Assisted Readiness Command and Control System

By LT Niki Crewes

Disclaimer: The positions represented in the paper and the briefing are those of the authors and not necessarily those of NPS, the Navy, or the DoD.



Defense Budget 2013

- Technology Spending \$37.2 Billion
- Science and Technology Investments \$11.9 Billion
- Command and Control \$8.2 Billion



LT Crewes

- Undergraduate Computer Science US Naval Academy
- 8 Years Navy Active Duty Experience
- Masters Degree Computer Science from the Naval Postgraduate School
- Engineering Duty Officer currently working for SPAWAR

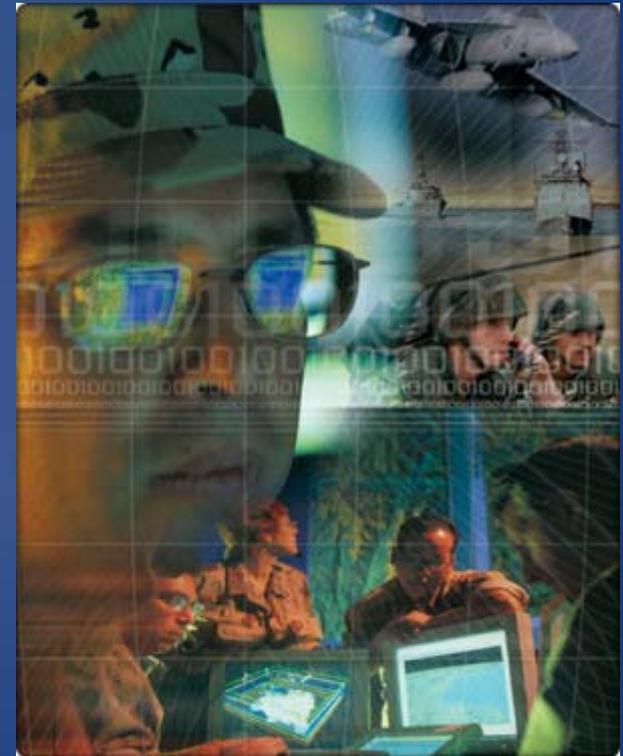


Outline

- Command And Control Problems
- SPARCCS as a Solution
- SPARCCS Requirements
- Command and Control Evolution
- SPARRCS Architecture
- SPARRCS Implementation
- SPARRCS Current Status and Limitations

Command And Control (C2) Problems

- Competition between multiple agencies
- Interoperability
- Jurisdiction
- Technology
- Communication
- Information Dissemination
- Unclear Chain of Command



SPARCCS Solution

- Smartphones in conjunction with cloud computing
- Benefits of collaborative mapping to mobile users
- Command Centers receive accurate real time data



SPARCCS Requirements

- Quick Set up – COTS smartphones, cloud-web infrastructure
- Tight-Loop/Frequent Communication – sync of video, text and pictures automatically
- Light-Weight Equipment
- Scalability
- Extended Battery Life



C2 Evolution

- World Wide Command and Control System (WMCCS)
- Global Command and Control System (GCCS)
- Blue Force Tracking
- Next Generation Incident Command System
- SPARCCS: uses the evolution of smartphone technology as a force multiplier in an academic endeavor

SPARCCS Architecture

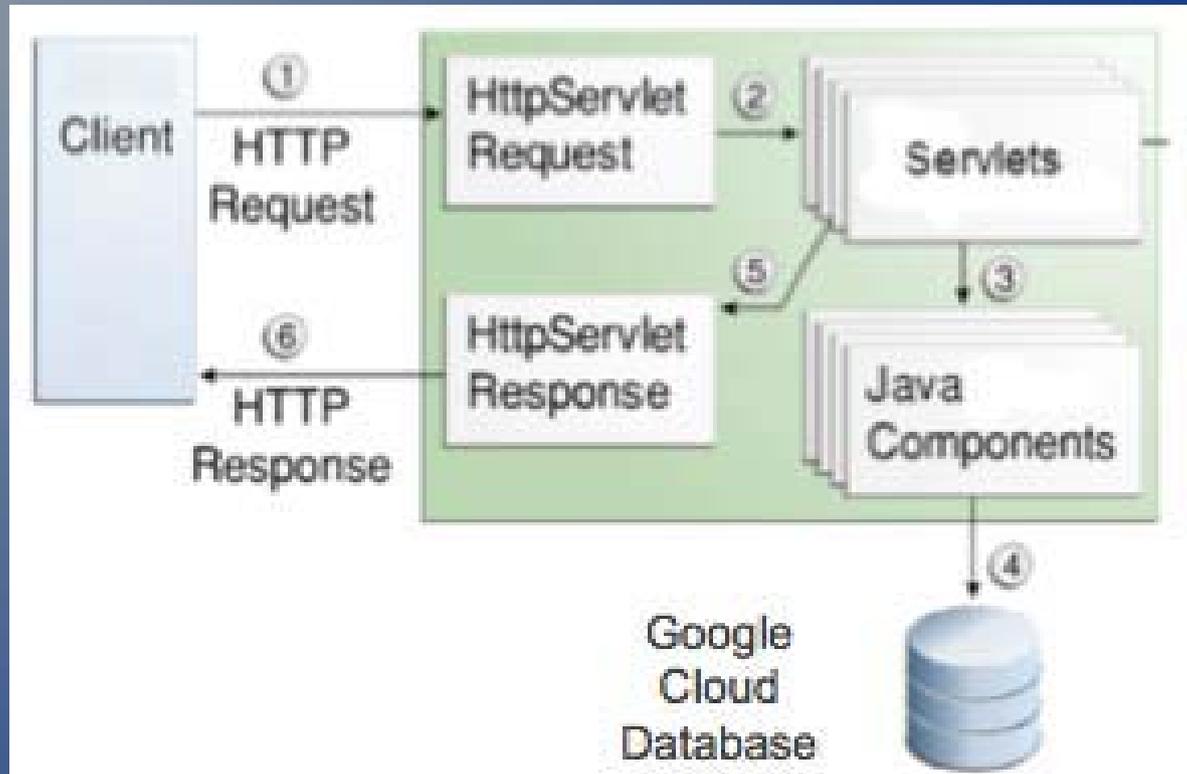
- Highly distributed cell phone network
- Cloud-based data base system aggregates information
- Web Service at the Command Post displays information



SPARCCS Key Features

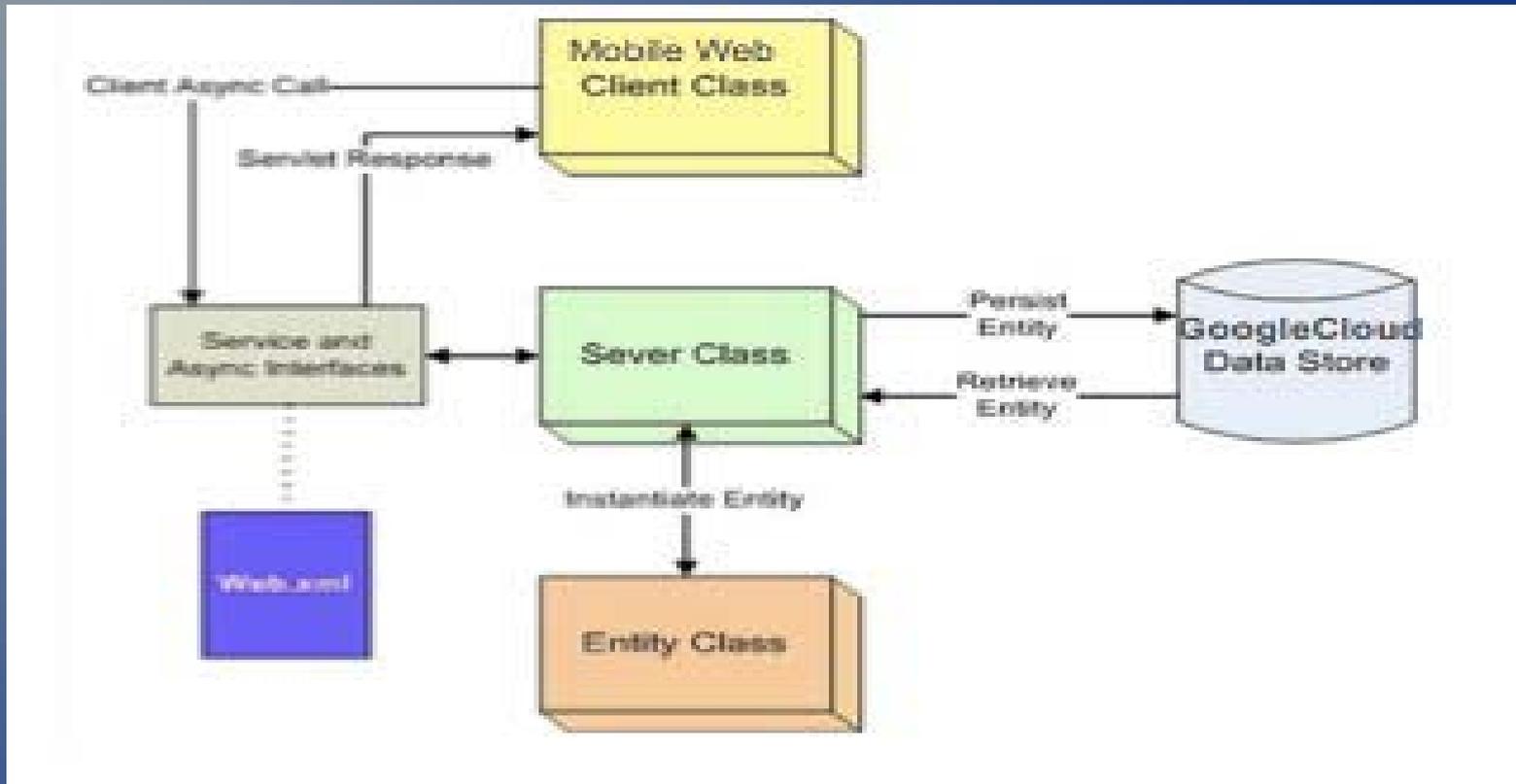
- Login to prevent unauthorized access
- Create, join, edit and view missions
- Create, edit view and delete points of interest (POI)
- Capture, edit, view and delete images
- View all missions, POI's and images on a map
- View all mission, POI's and responder information in a list format
- Retrieve GPS location (HTML 5/Smartphone)
- Store all information locally on android or cloud database
- Syncing between android and cloud databases

Android System Architecture



(1). The HTTP request interacts with the HTTP servlets using HttpServlet Requests (2). These servlets form Java components in our case Objectified Data objects (3) to perform CRUD operations with cloud database (4). The servlets then create the appropriate HTTP Servlet Response (5) back to the requesting client (6). The information is then displayed in the client.

Web Client System Architecture



The overall system architecture from the web client perspective. The only difference being the remote procedure calls instead of the HTTP posts and requests.

SPARCCS Implementation

- System Revolves around 4 main classes
 - Responder
 - Mission
 - Point of Interest
 - Image/Video
- Syncing
 - Application multi-threading
 - Data stored locally then marked for upload
 - Thread sleep and wake process to maximize battery life

Cloud Implementation

Welcome MNCrewes

SPARCCS Headquarters Application

Smart Phone Assisted Rapid Command and Control System

Missions

Name	Creator	Start	End	Show
Security Patrol	MNCrewes	03/01/2012	03/04/2012	
Port Patrol	MNCrewes	02/24/2012	03/11/2012	
Earthquake Relief	MNCrewes	03/02/2012	03/17/2012	

Add/Mission Options
Points Of Interest
Add/Point of Interest Options
Responders
Responder Options
Photos
Map Options

Last Updated Mon Feb 27 16:10:47 GMT-800 2012

Map data ©2012 Google, MapLink, Tele Atlas - Terms of Use

Mission/POI Display and Flow

Missions				
Name	Creator	Start	End	Show
Security Patrol	MHCrews	03/01/2012	03/04/2012	
Eod Patrol	MHCrews	02/24/2012	03/11/2012	
Earthquake Relief	MHCrews	03/02/2012	03/17/2012	

AddMission Options
Points Of Interest
AddPoint of Interest Options
Responders
Responder Options
Photos
Map Options



Missions				
Name	Creator	Start	End	Show
Security Patrol	MHCrews	03/01/2012	03/04/2012	
Patrol Security Perimeter			EOD...	
Eod Patrol	MHCrews	02/24/2012	03/11/2012	
Earthquake Relief	MHCrews	03/02/2012	03/17/2012	



Selected Mission

Mission Name
Security Patrol

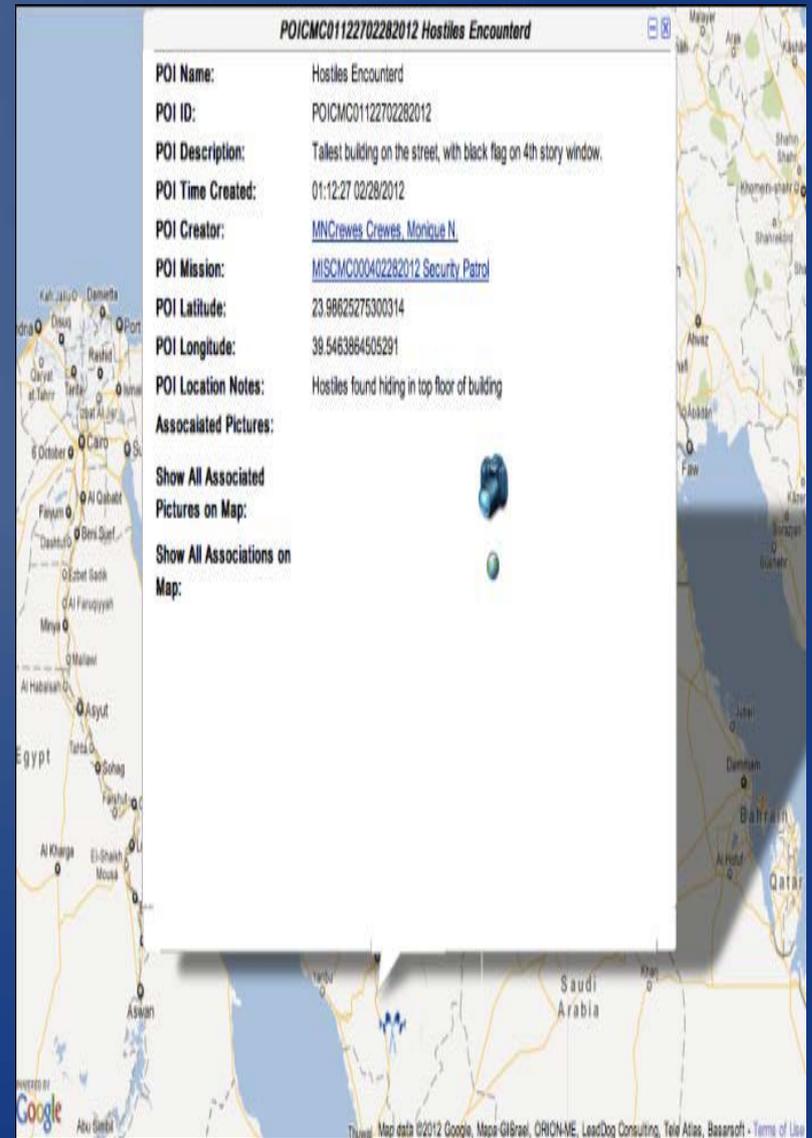
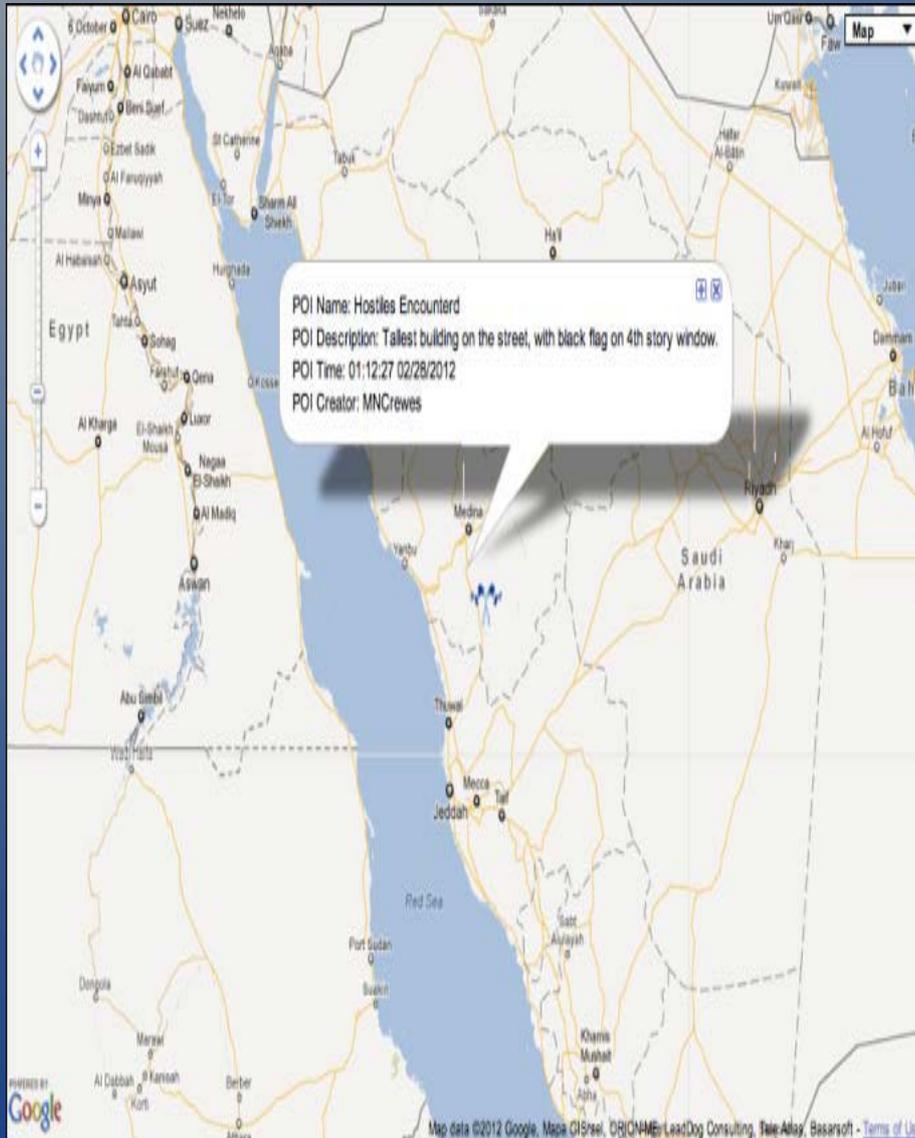
Mission Location
Latitude: 34.84029100010004 Longitude: -10.03071600020079

Mission Dates
Start Date: 03/01/2012 End Date: 03/04/2012

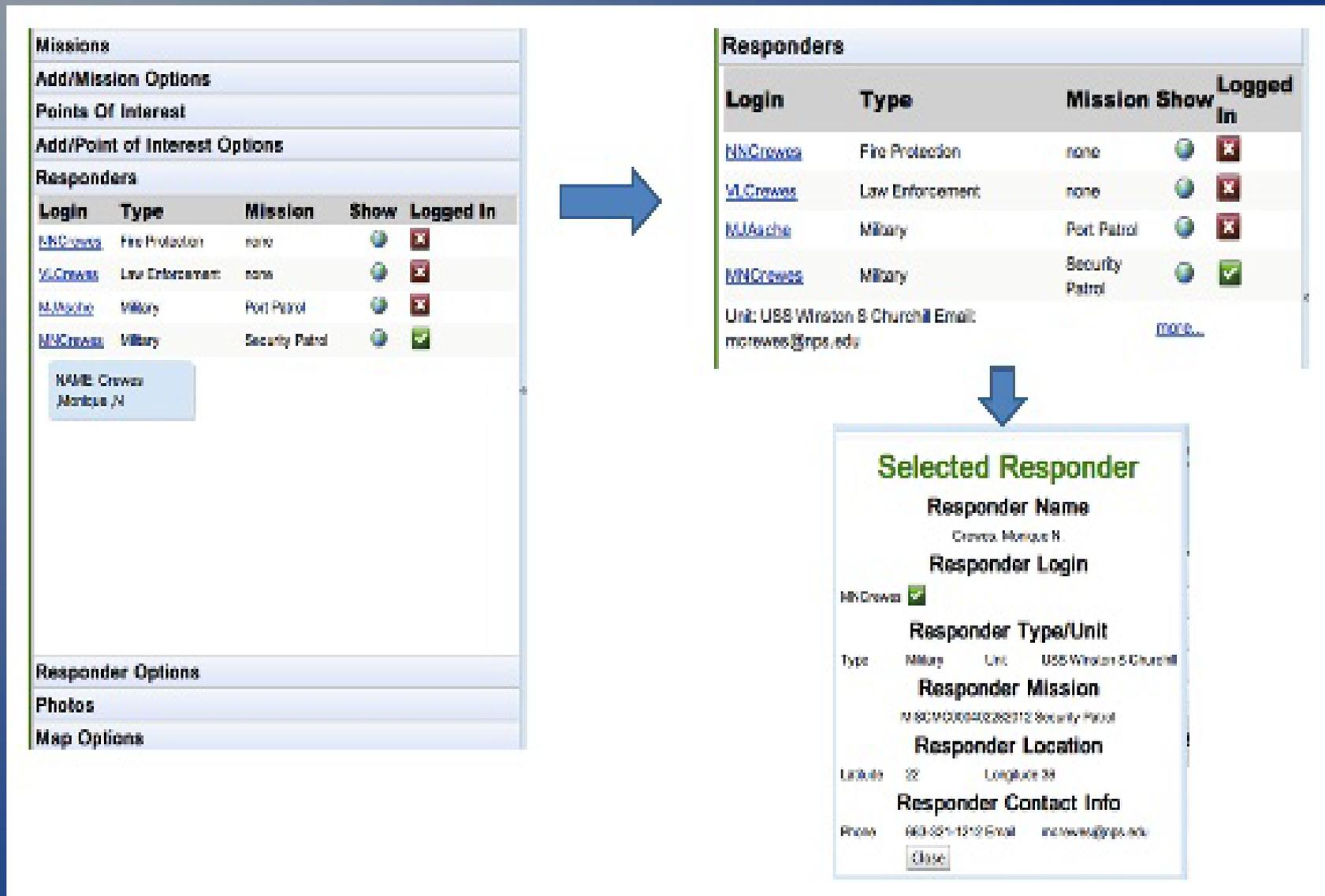
Mission Description
Patrol Security Perimeter

Misc. Mission Information
Starting at 0700

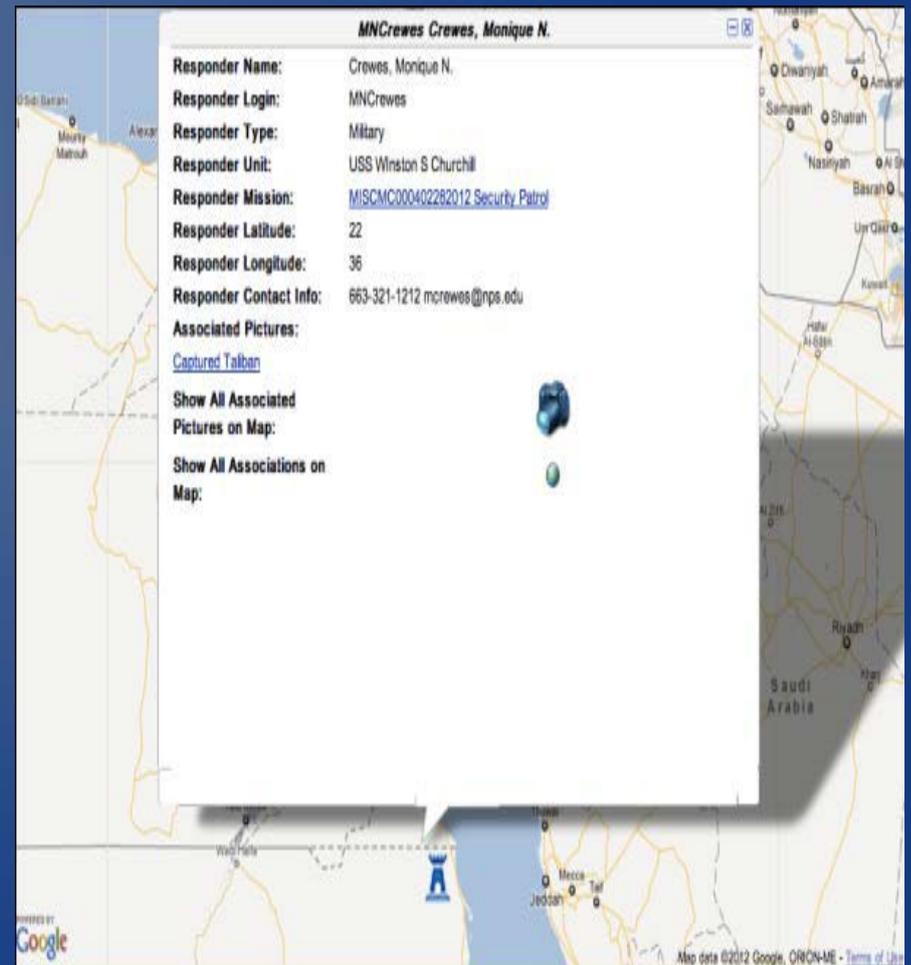
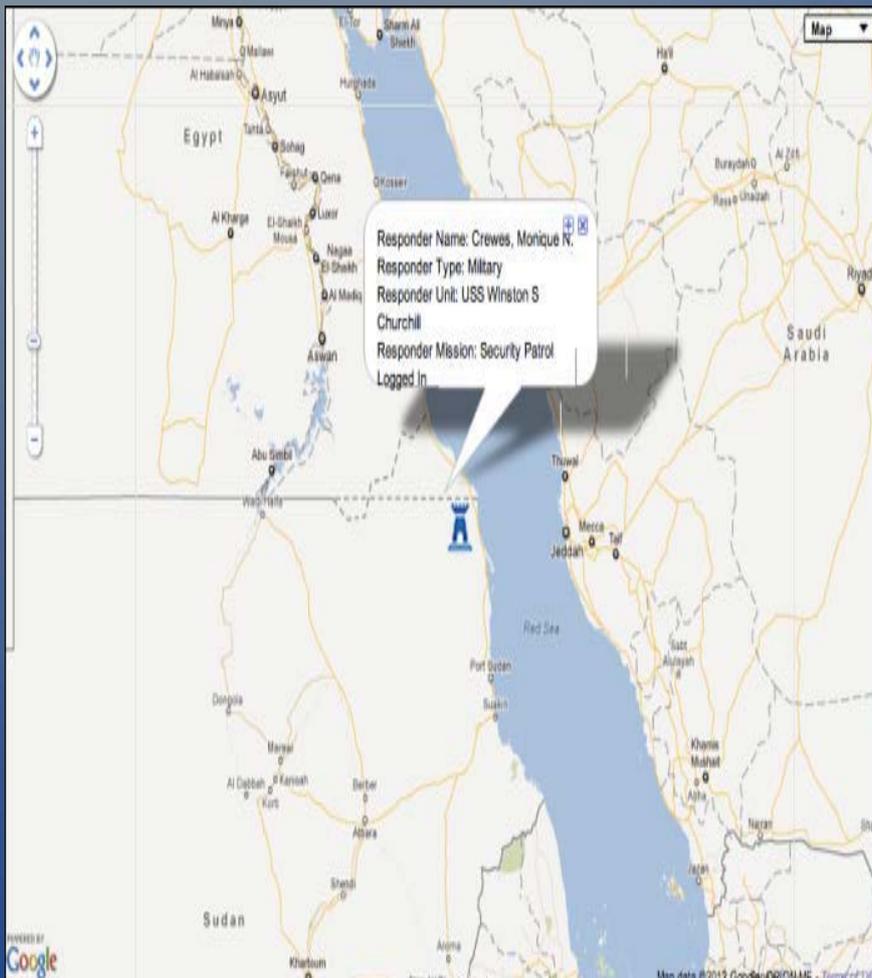
Mission/POI Display and Flow



Responder Display and Flow



Responder Display and Flow



Image/Video Display and Flow

Add/Mission Options

Points Of Interest

Add/Point of Interest Options

Responders

Responder Options

Photos

Missions

- Add Image to a Mission See Images From a Mission See All Mission Images

MISCMC000402282012 | Security Patrol
MISCMC000502282012 | Port Patrol
MISCMC000702282012 | Earthquake Relief

Points of Interest (POI's)

- Add Image to a POI See Images From a POI See All POI Images

POICMC00093202282012 | Earthquake Relief Overflow | MISCMC000702282012 |
POICMC00112002282012 | Weapons Cache Found | MISCMC000502282012 | Poi
POICMC01122702282012 | Hostiles Encounter | MISCMC000402282012 | Securi

Responders

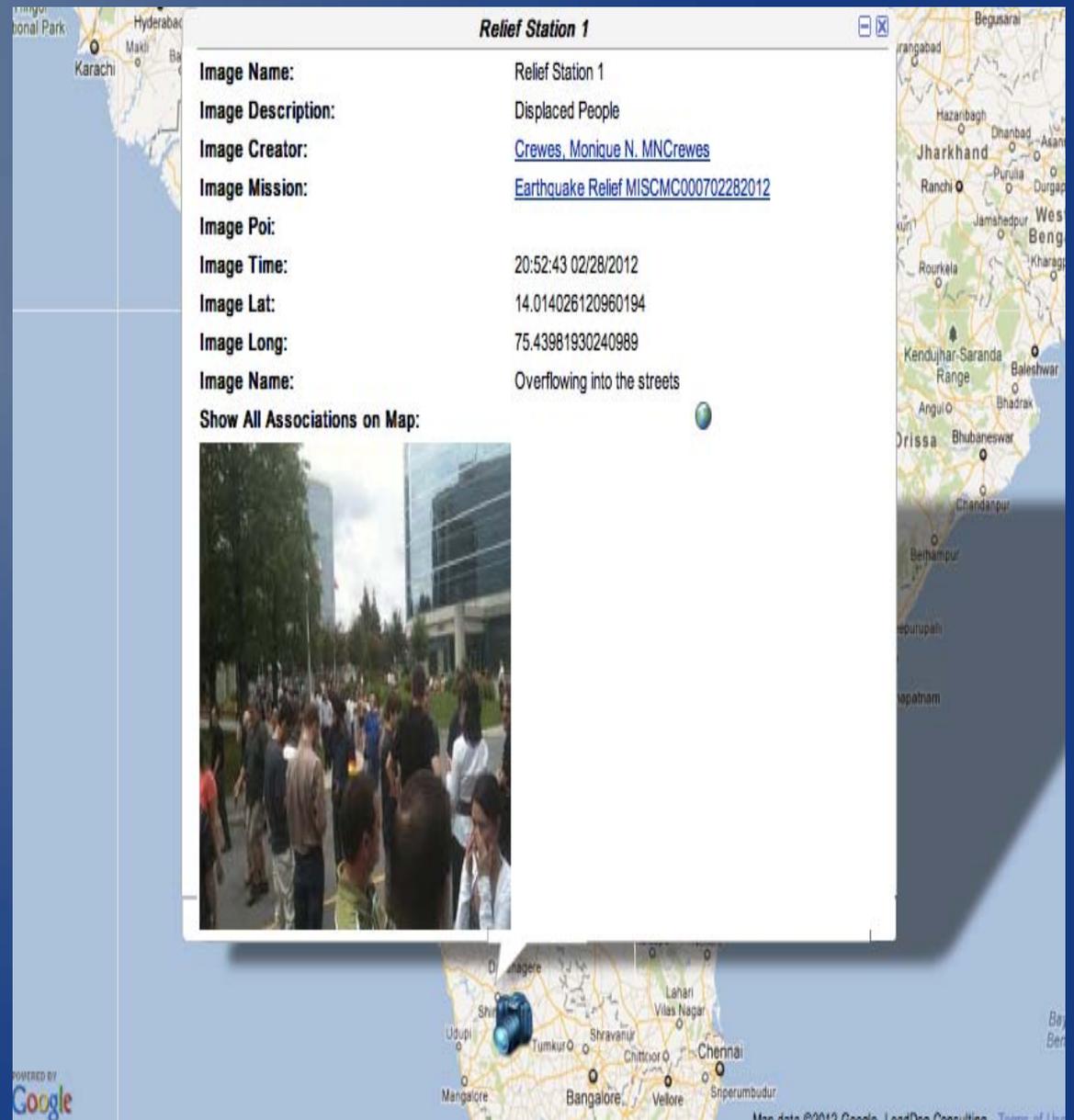
- See Images From a Responder

NNCrewes

VLCrewes

MJAsche

MNCrewes



Relief Station 1

Image Name: Relief Station 1

Image Description: Displaced People

Image Creator: [Crewes, Monique N. MNCrewes](#)

Image Mission: [Earthquake Relief MISCMC000702282012](#)

Image Poi:

Image Time: 20:52:43 02/28/2012

Image Lat: 14.014026120960194

Image Long: 75.43981930240989

Image Name: Overflowing into the streets

Show All Associations on Map:



Map data ©2012 Google, LeadDoo Consulting - Terms of Use

Image/Video Display and Flow

[SlideShow...](#)

Pictures from Earthquake Relief



Picture Description:
Displaced People

Close



Title: Relief Station 1



Description: Displaced People

Creator: MNCrewes Crewes, Monique N.

Lat: 14.014026120960194 Long: 75.43981930240989

Location Notes: Overflowing into the streets

Delete



Mobile Implementation



POIs

Users

Missions

Image

Mobile Implementation



Image Name:
Prof

Image description:

Image Location Notes:

Mission:
Demo

Point Of Interest:
None

Image Creator:
Asche, Mike J.

Save

Delete

Cancel

- Mobile implementation has the same capabilities as the web client
- Images/Video however can be taken directly from phone and uploaded

Current Status Limitations

- Ongoing project at the Naval Postgraduate School
- Field tests at Camp Roberts
- Native application only works for Android Phones
- Phone/Cloud Security issues
- Specializing SPARCCS for medical triage



Questions

