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

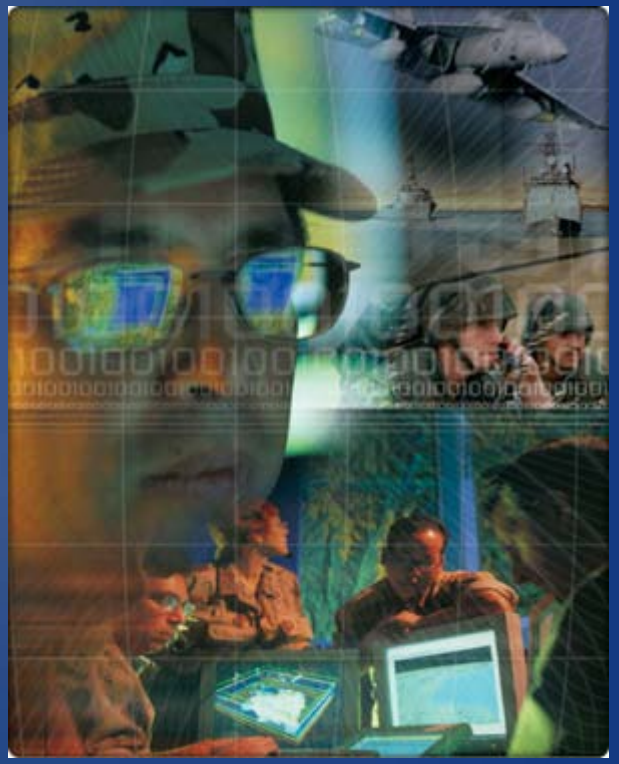
- Undergraduate Computer Science US Naval Academy
- 8 Years Navy Active Duty Experience
- Masters Degree Computer Science from the Naval Postgraduate School
- Engineering Duty Officer currently working for SPAWAR

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

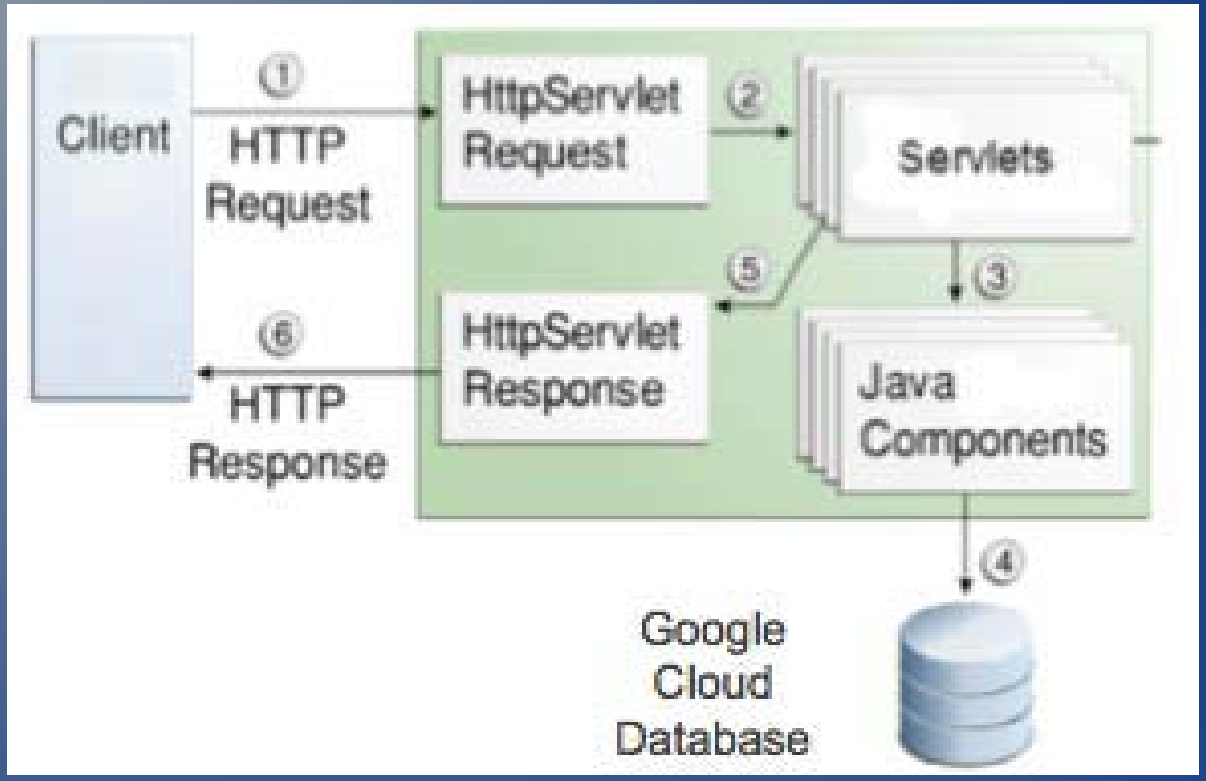
SPARCCS Architecture

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

SPARCCS Key Features

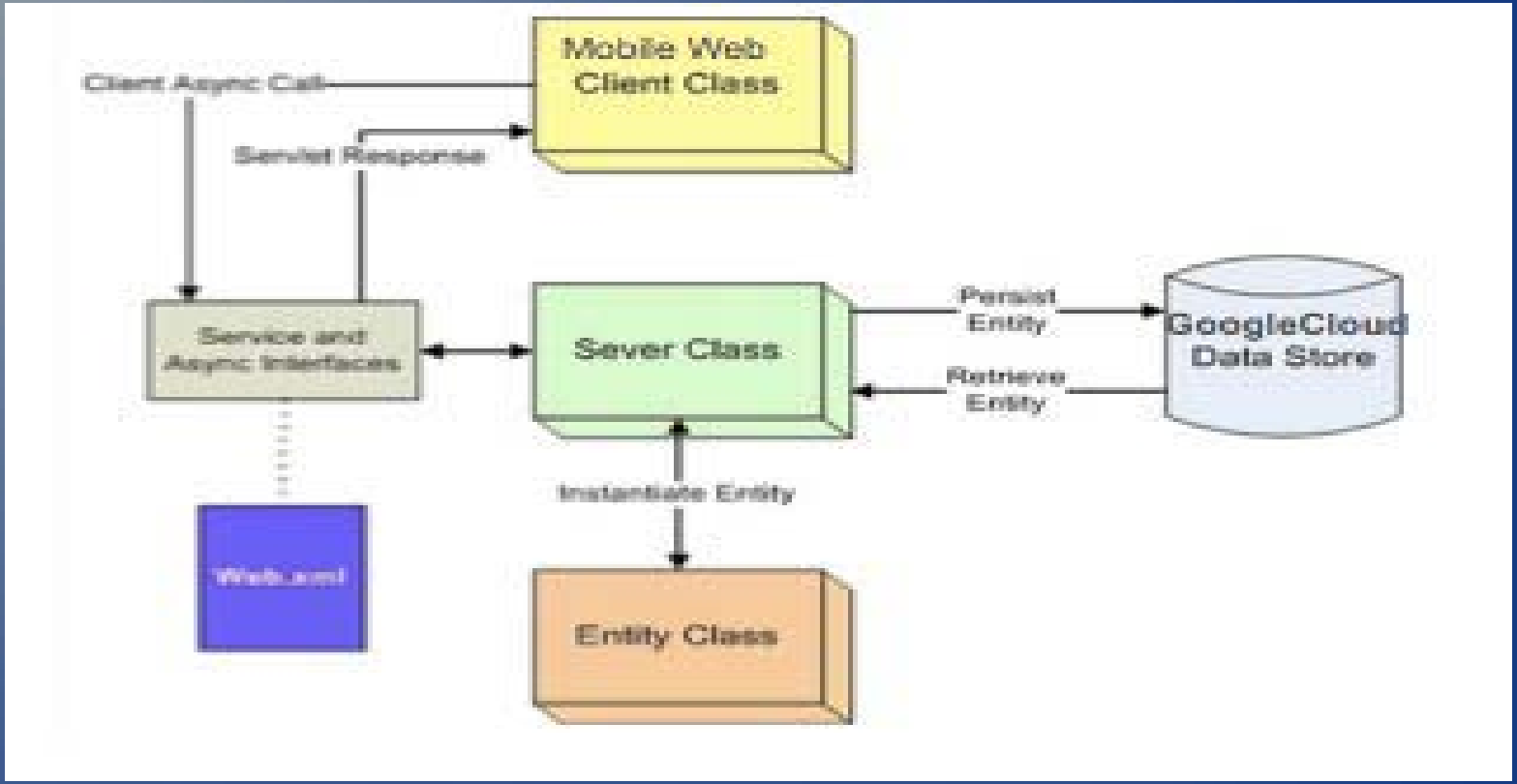
- Login to prevent unauthorized access
- Create, join, edit and view missions
- Create, edit view and delete points of interest (POI)
- Capture, edit, view and delete images
- View all missions, POI's and images on a map
- View all mission, POI's and responder information in a list format
- Retrieve 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

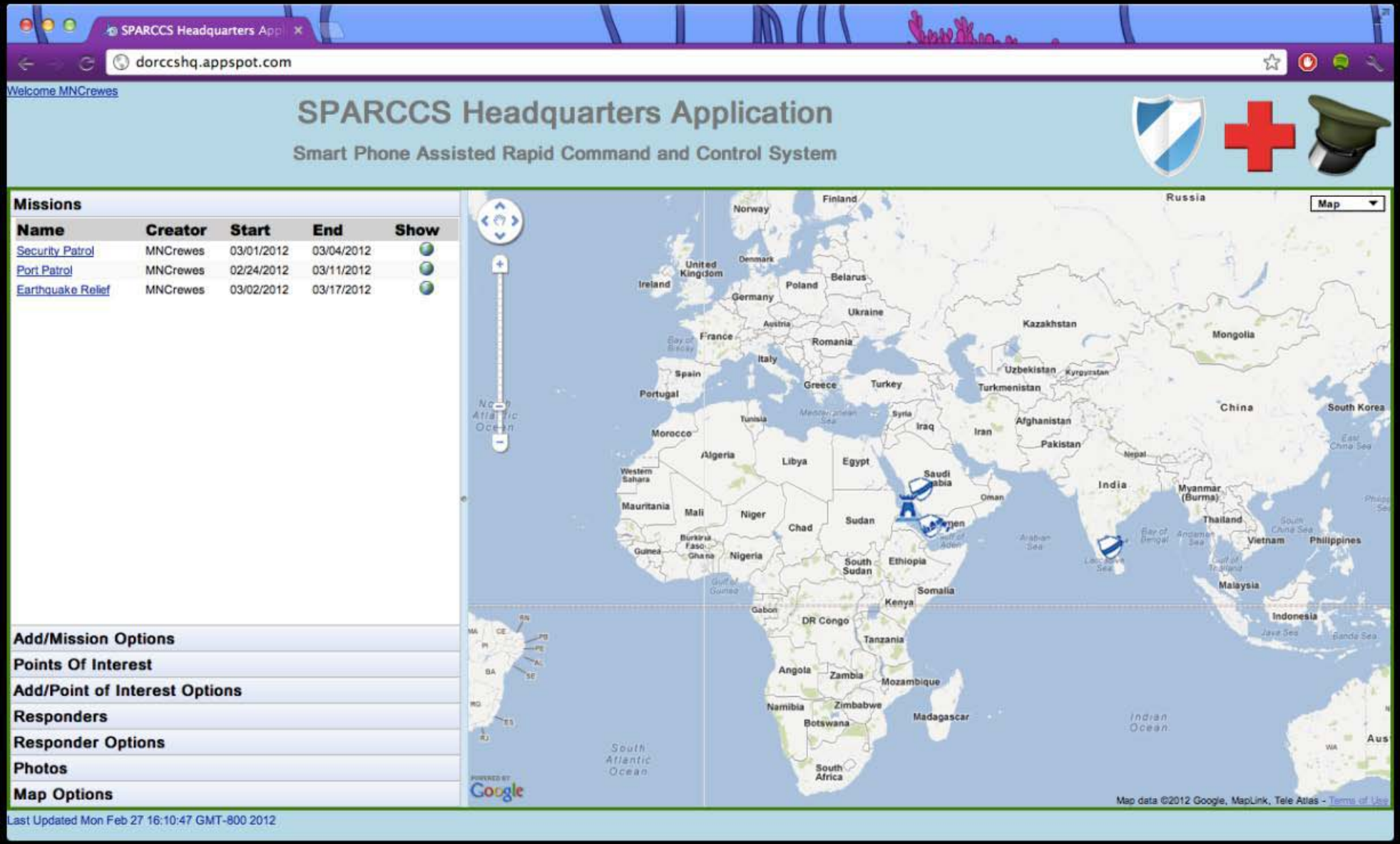


The overall system architecture from the web client perspective. The only difference being the remote procedure calls instead of the HTTP posts and requests.

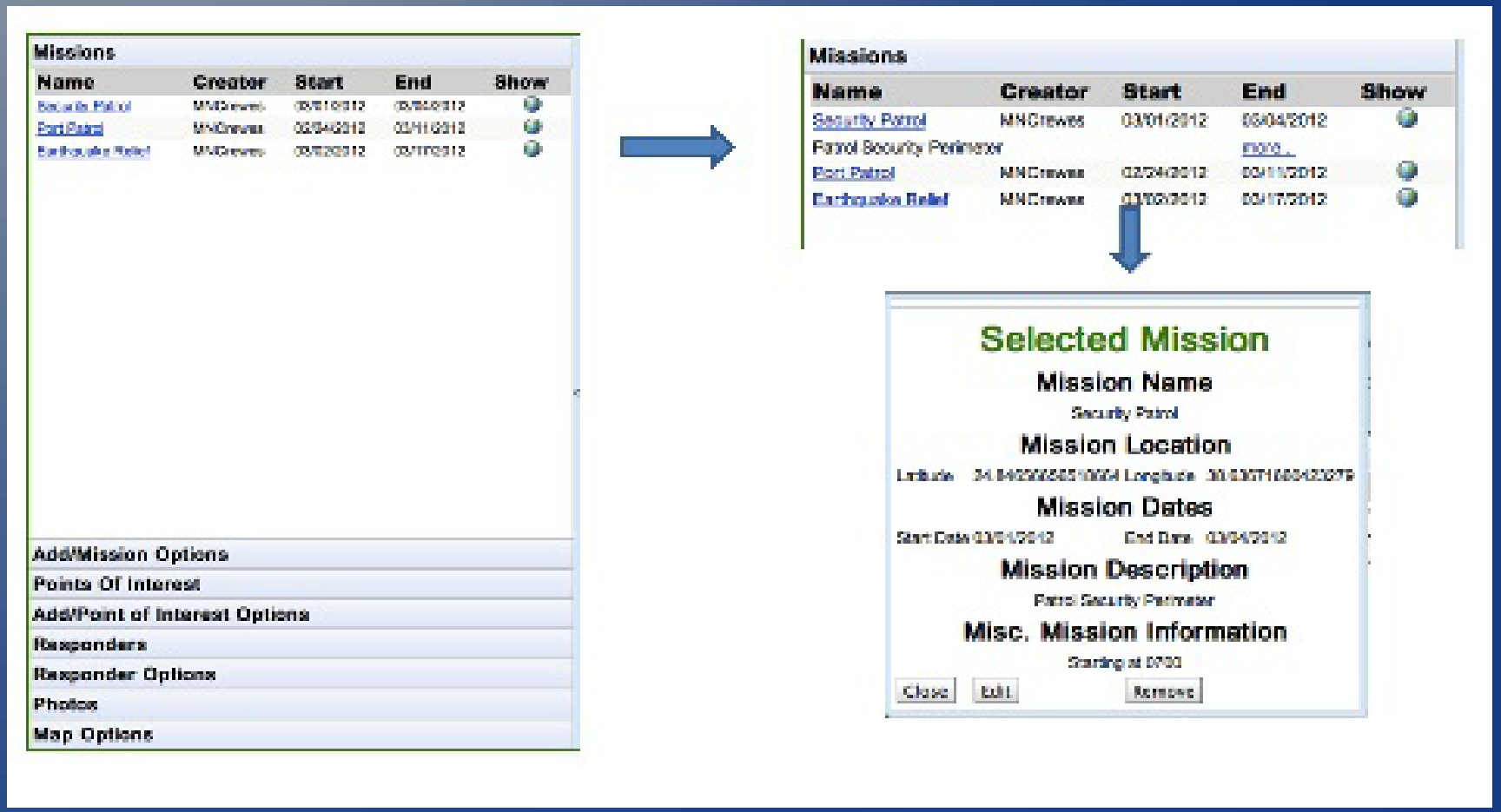
SPARCCS Implementation

- 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



Mission/POI Display and Flow



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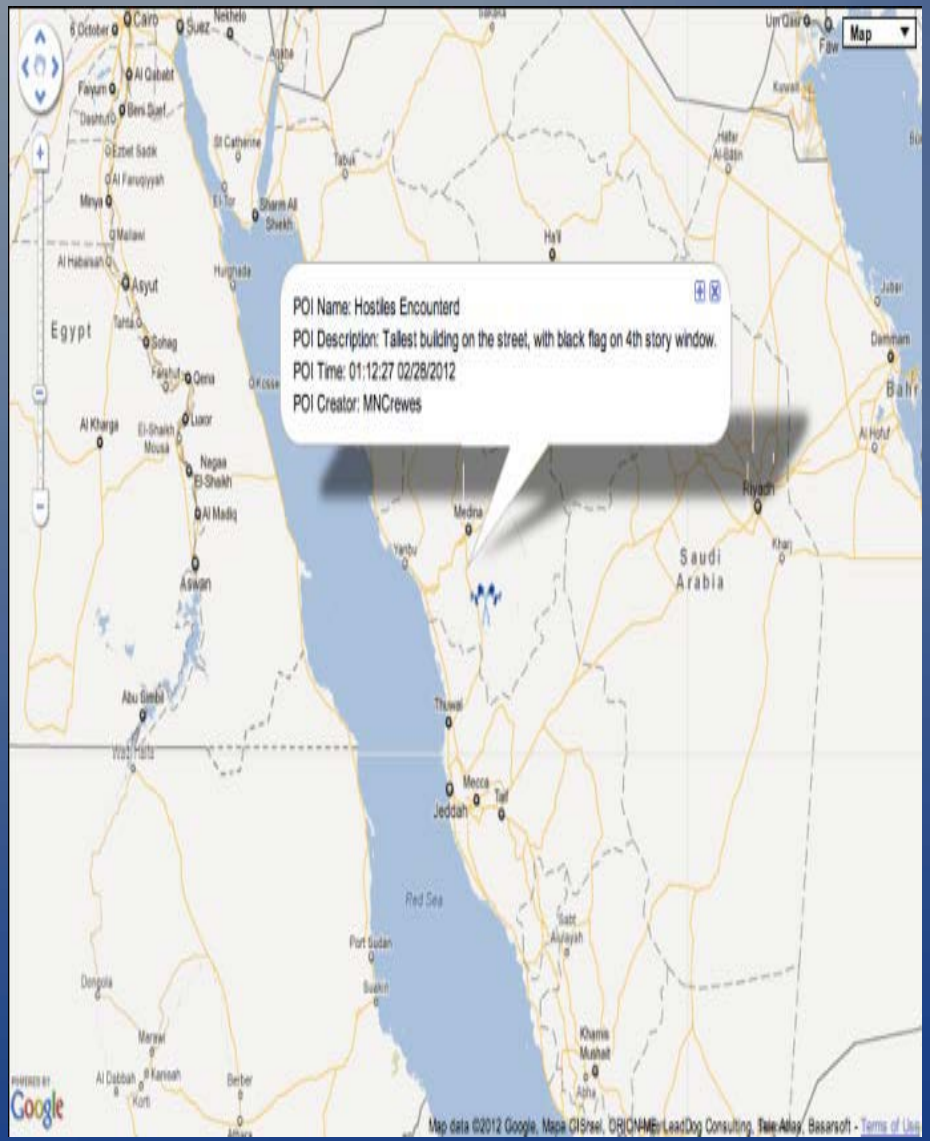
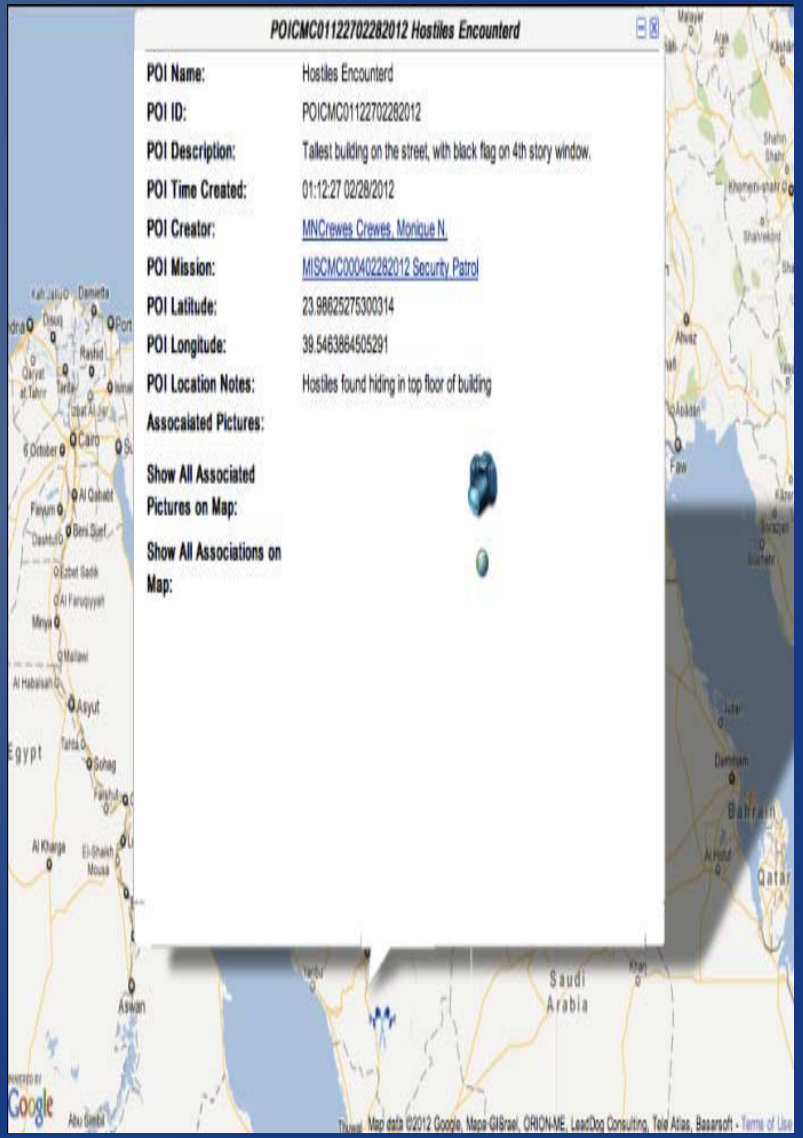
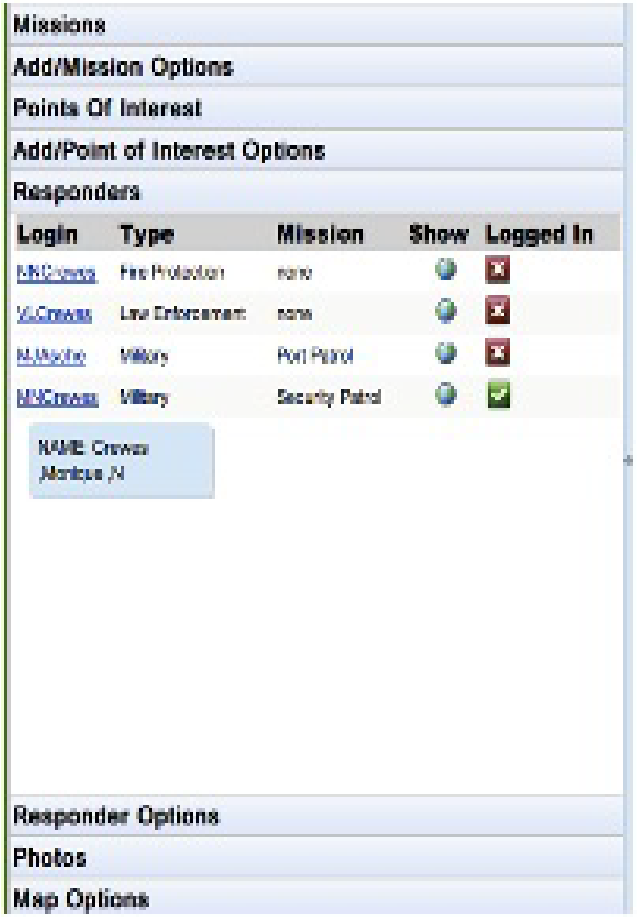
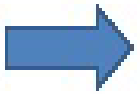
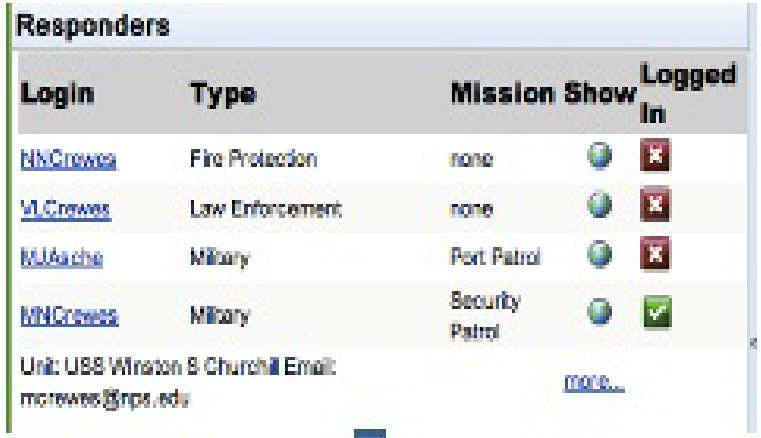


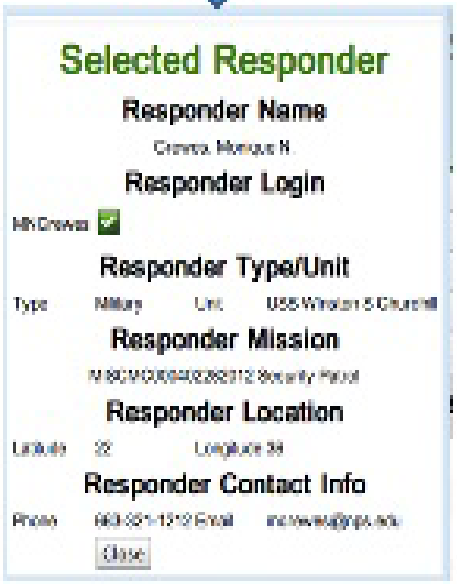


Responder Display and Flow

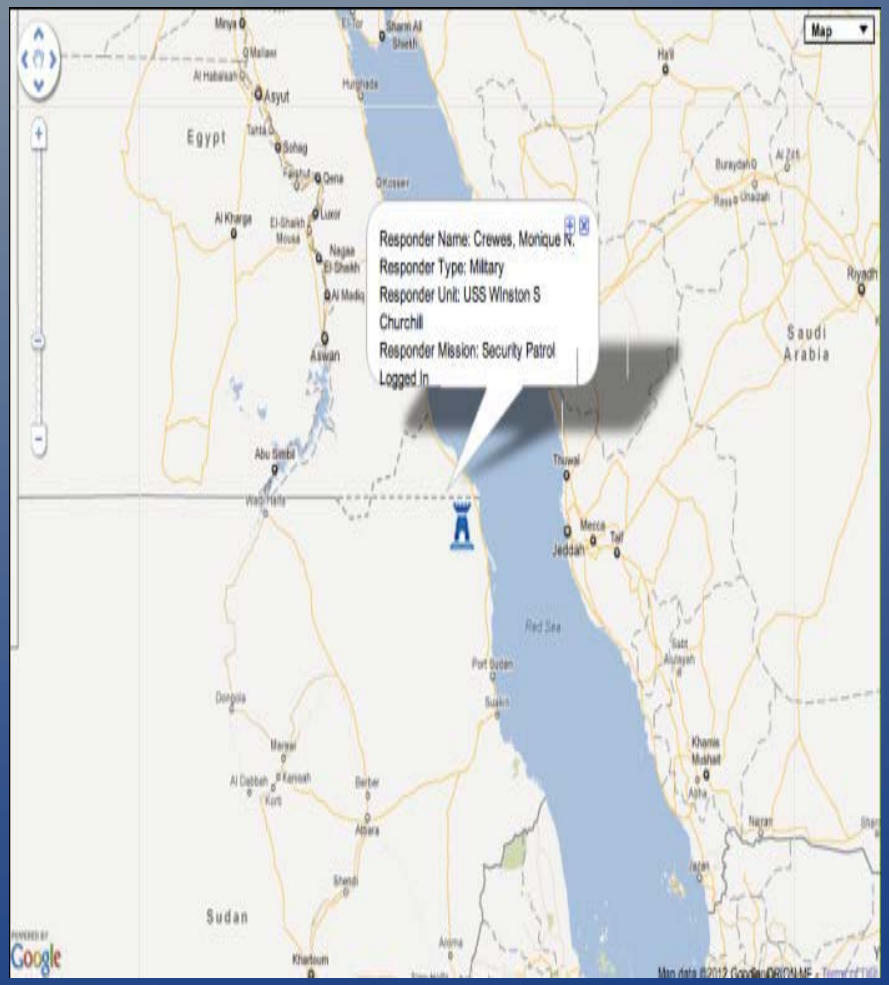


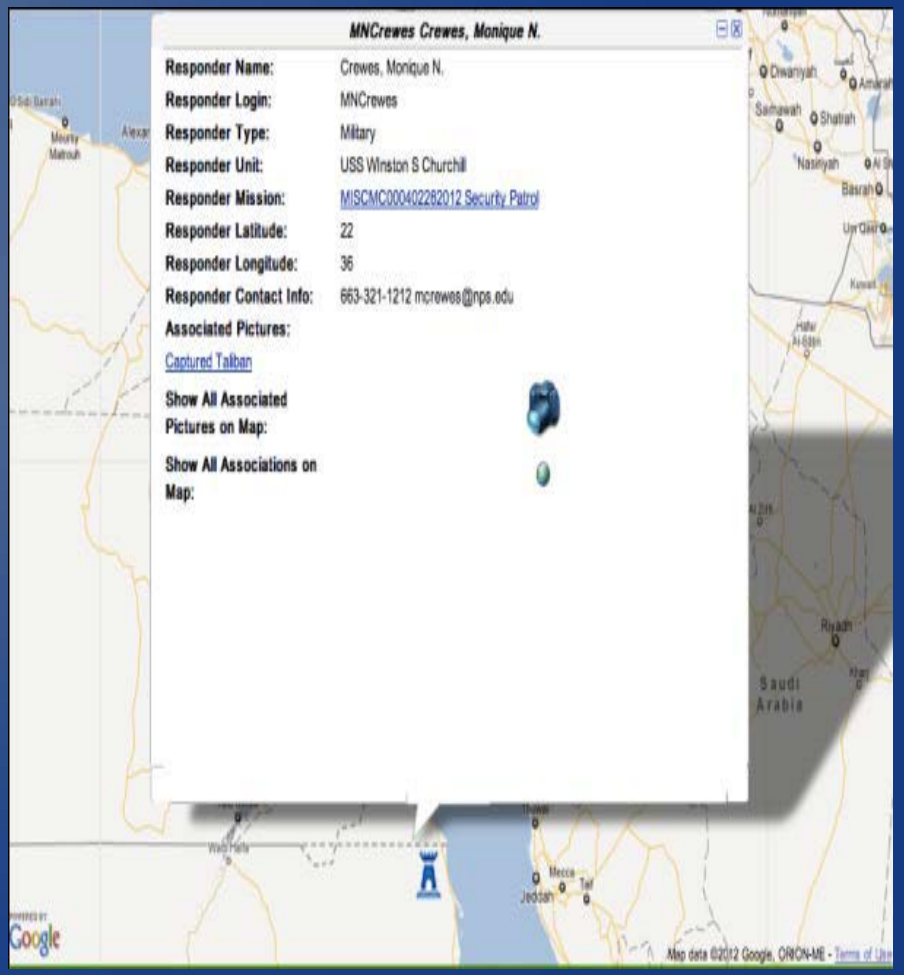




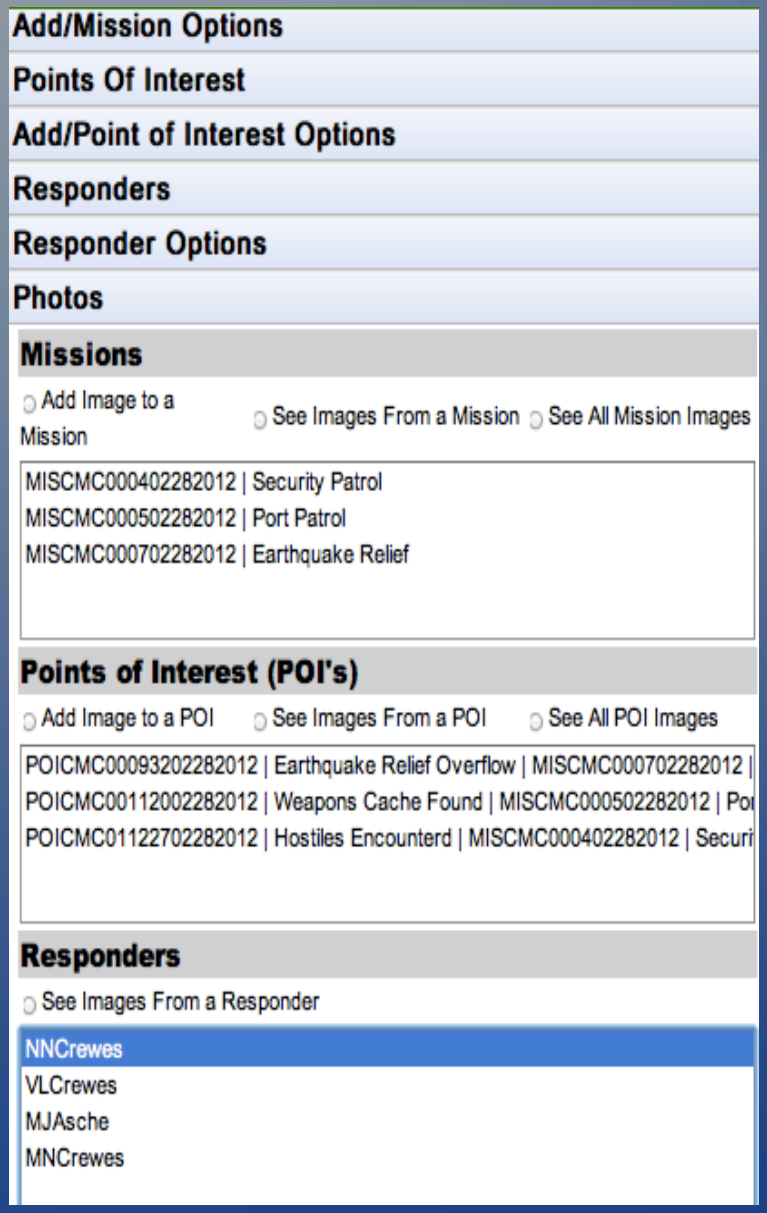


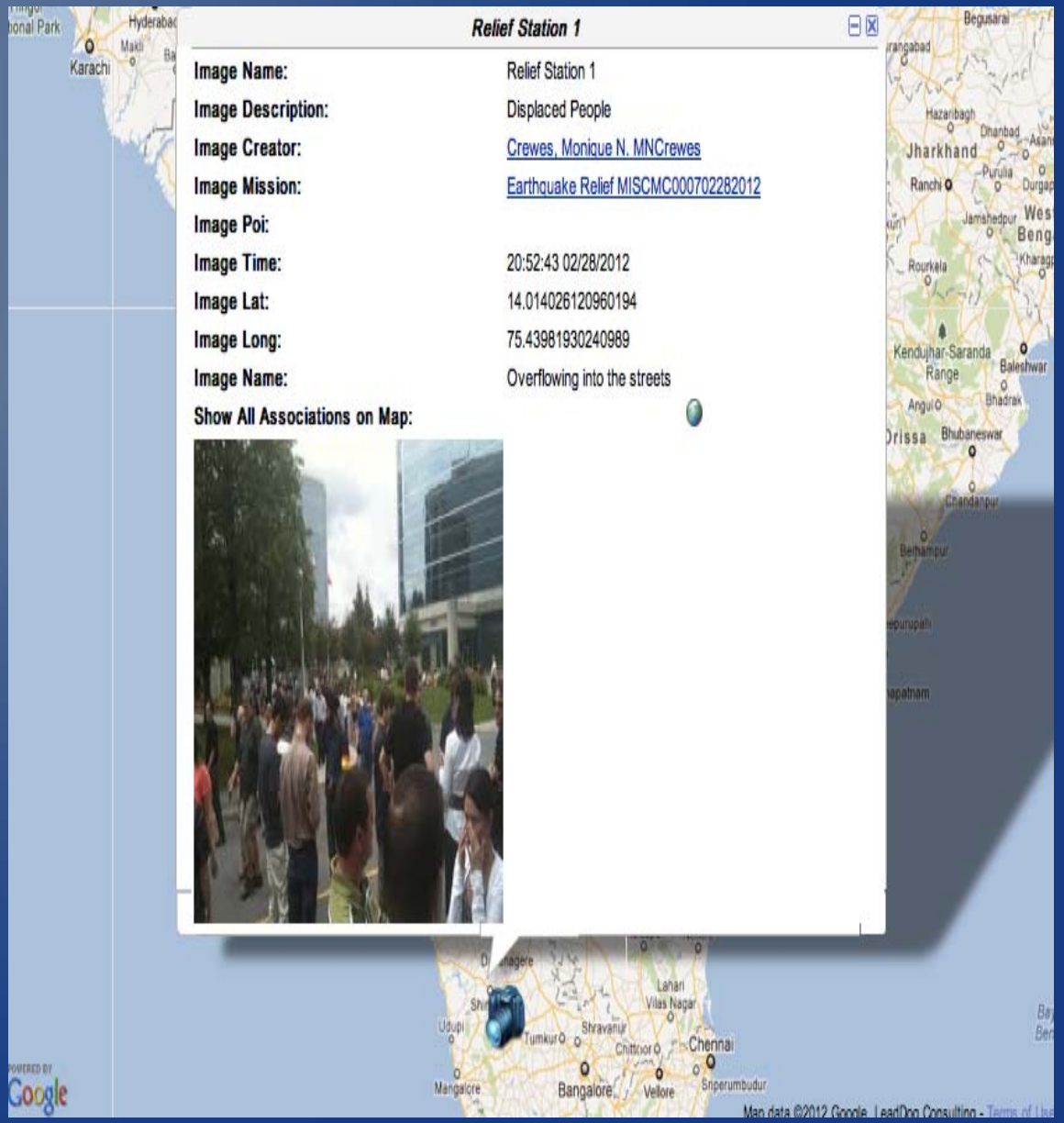
Responder Display and Flow





Image/Video Display and Flow





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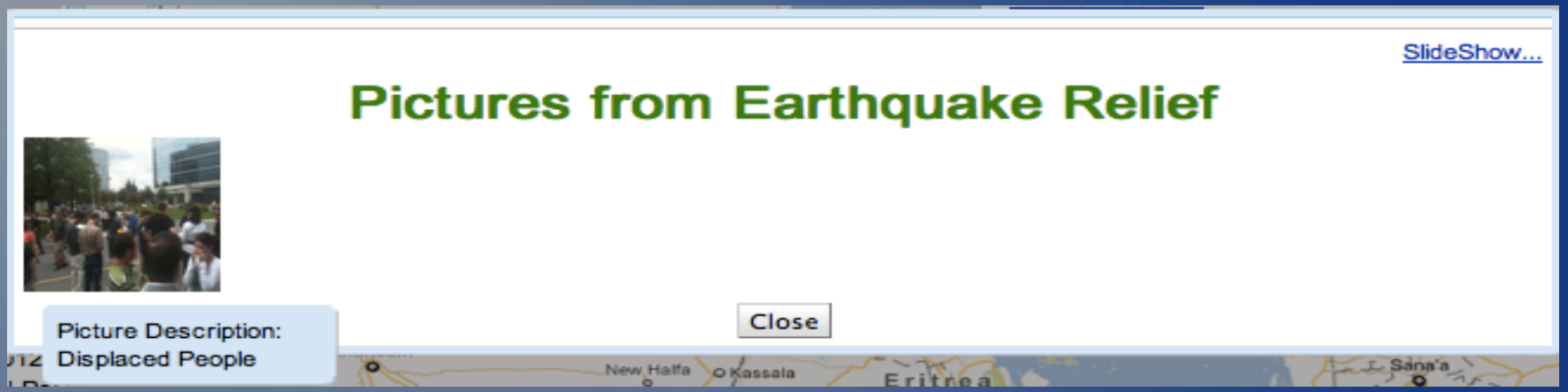
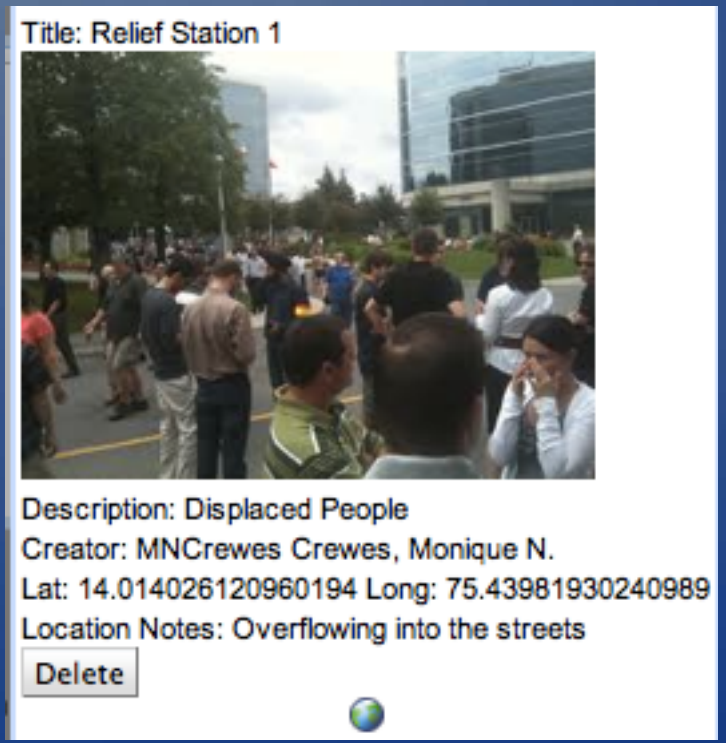
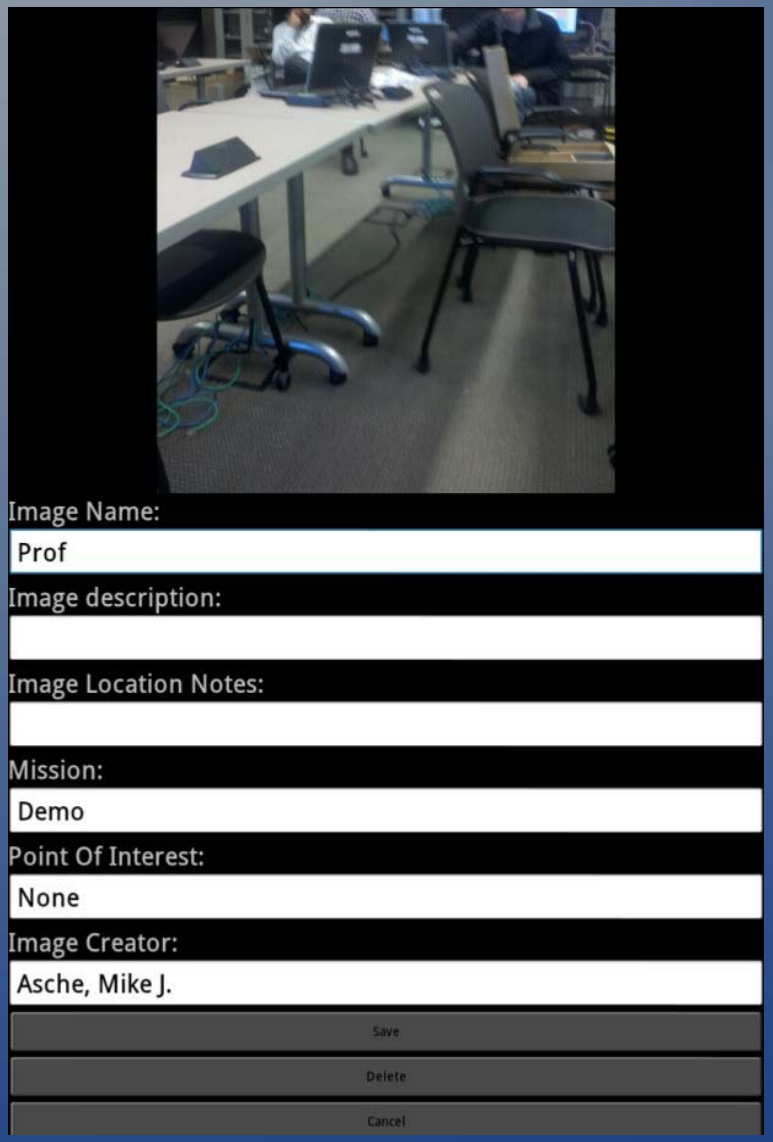




Mobile Implementation

POIs	Users
Missions	Image

Mobile Implementation



- 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