Contextual Geotracking of Incident Markers for Disaster Search-and-Rescue Operations

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VIMAN Lab
VIRTUALIZATION, MULTIMEDIA AND NETWORKING LAB

Problem Overview

- First responders need the ability to work together to effectively survey a scenario and provide treatment

- Situational awareness can decrease triage time and increase the total number of lives saved, while providing the most efficient distribution of resources
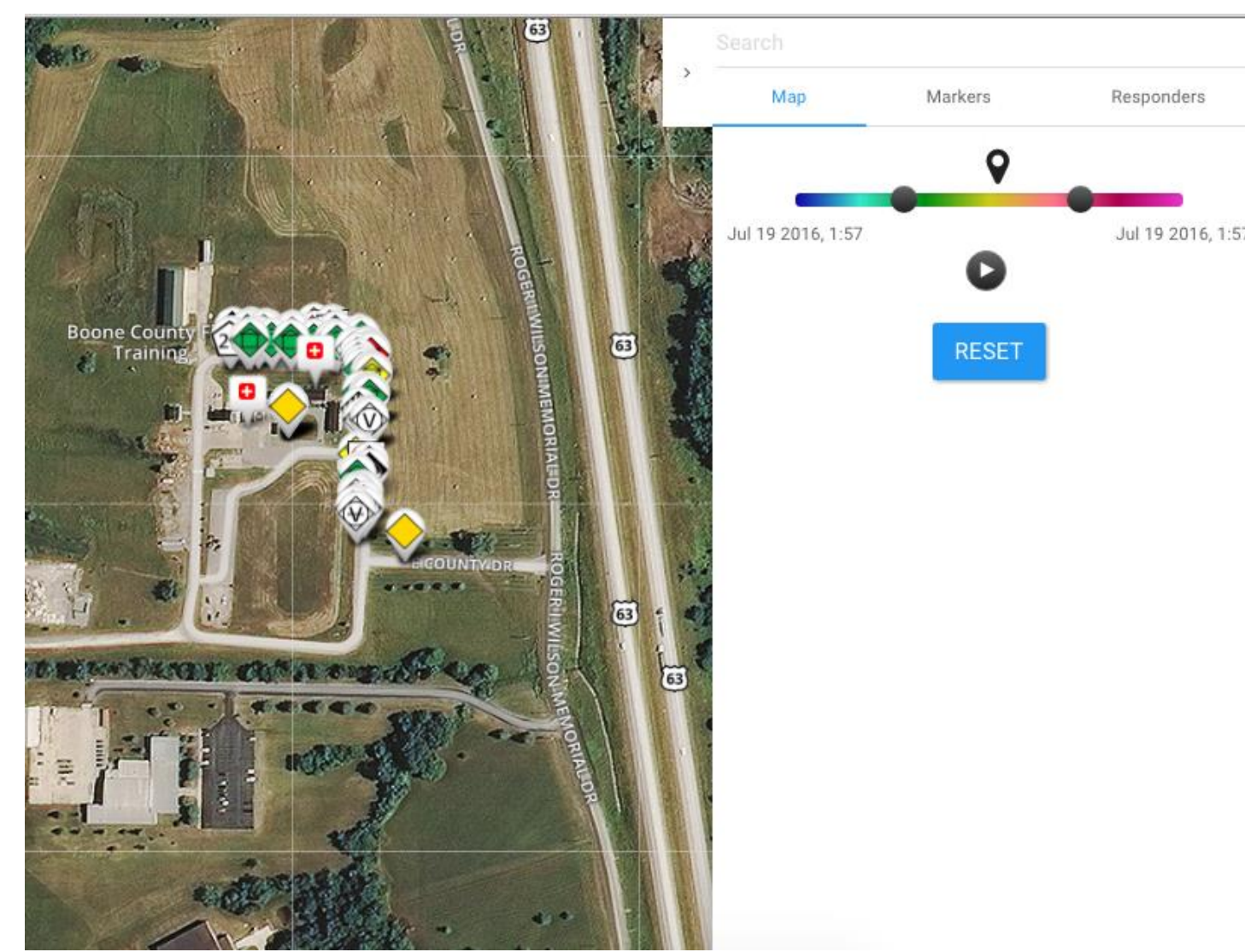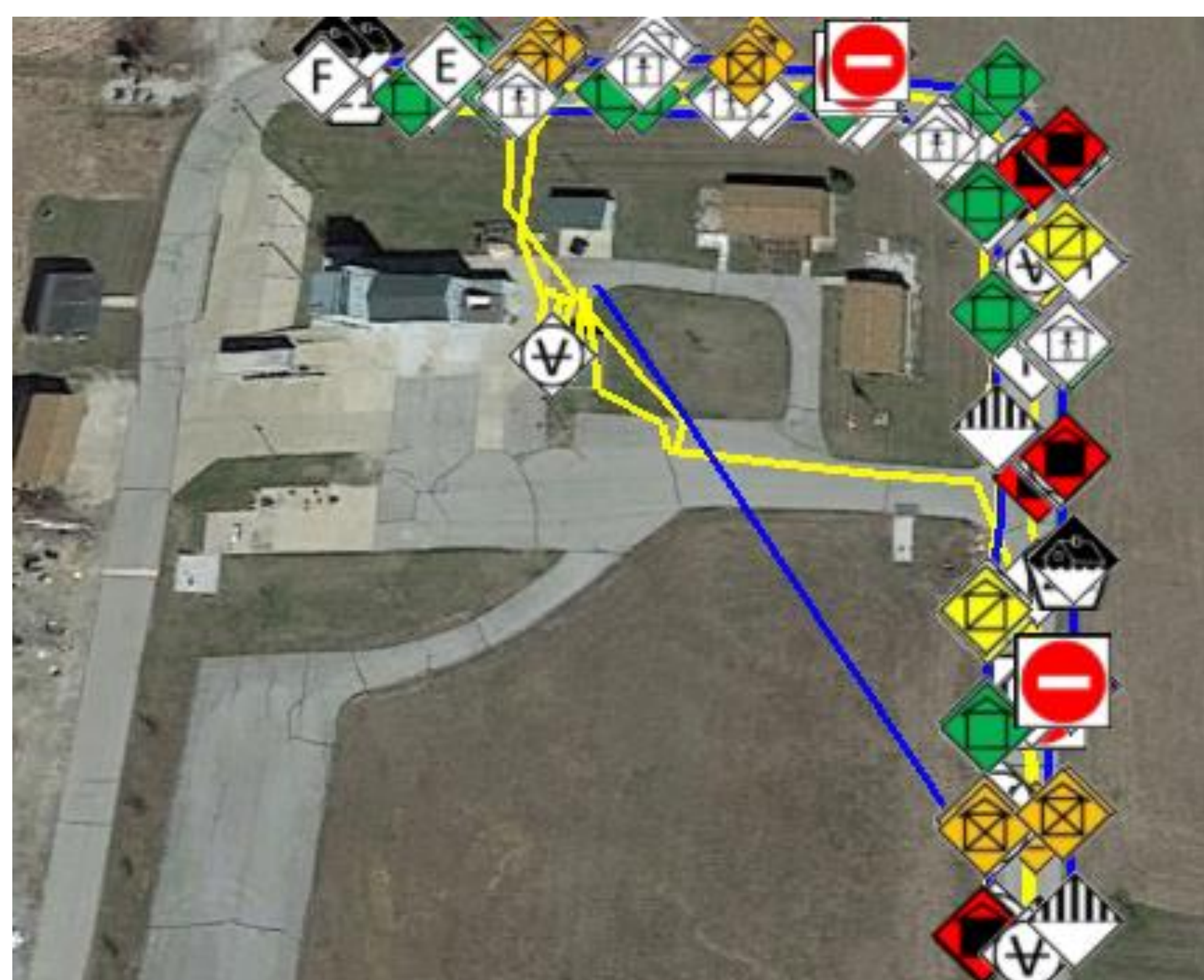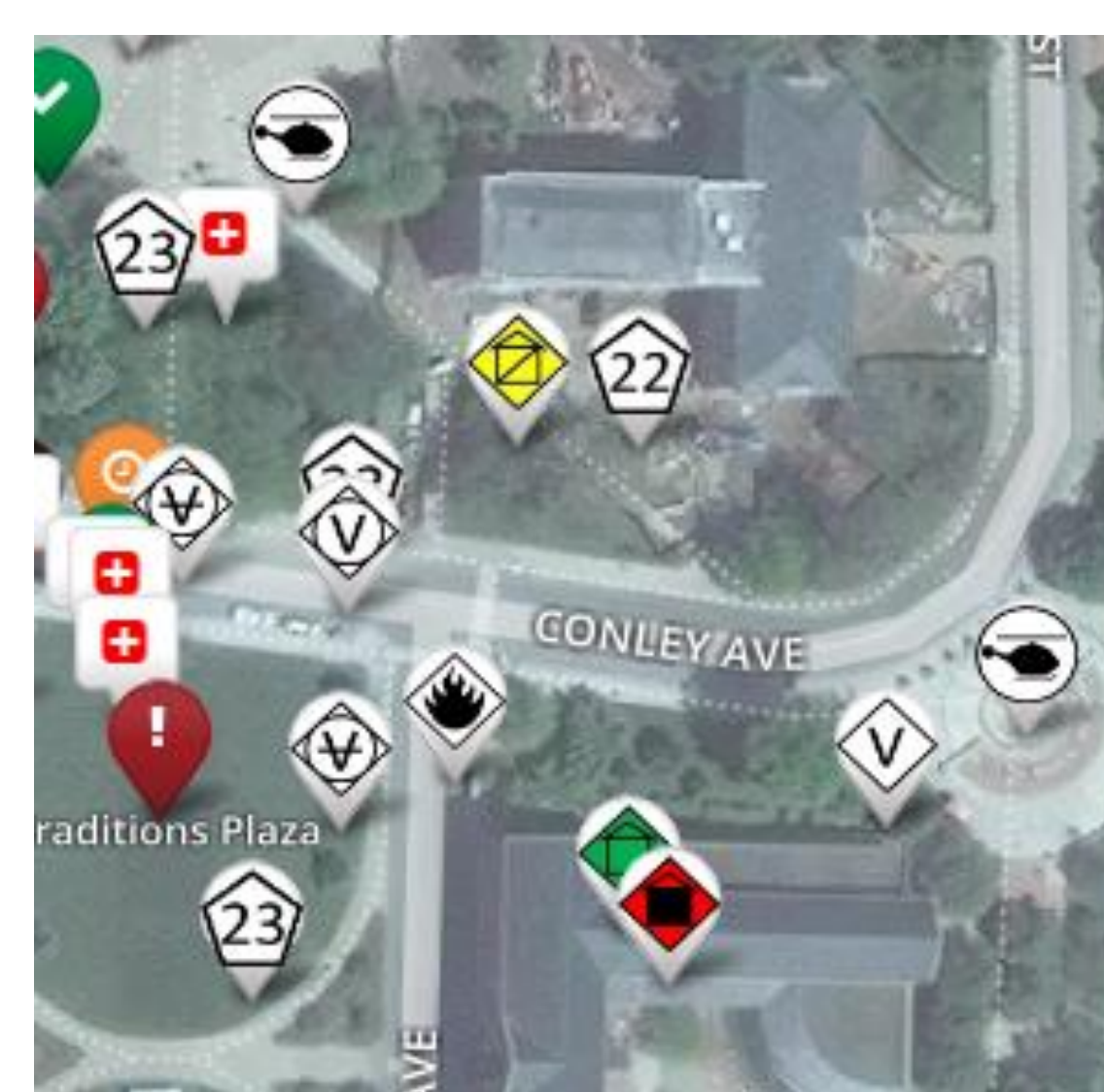
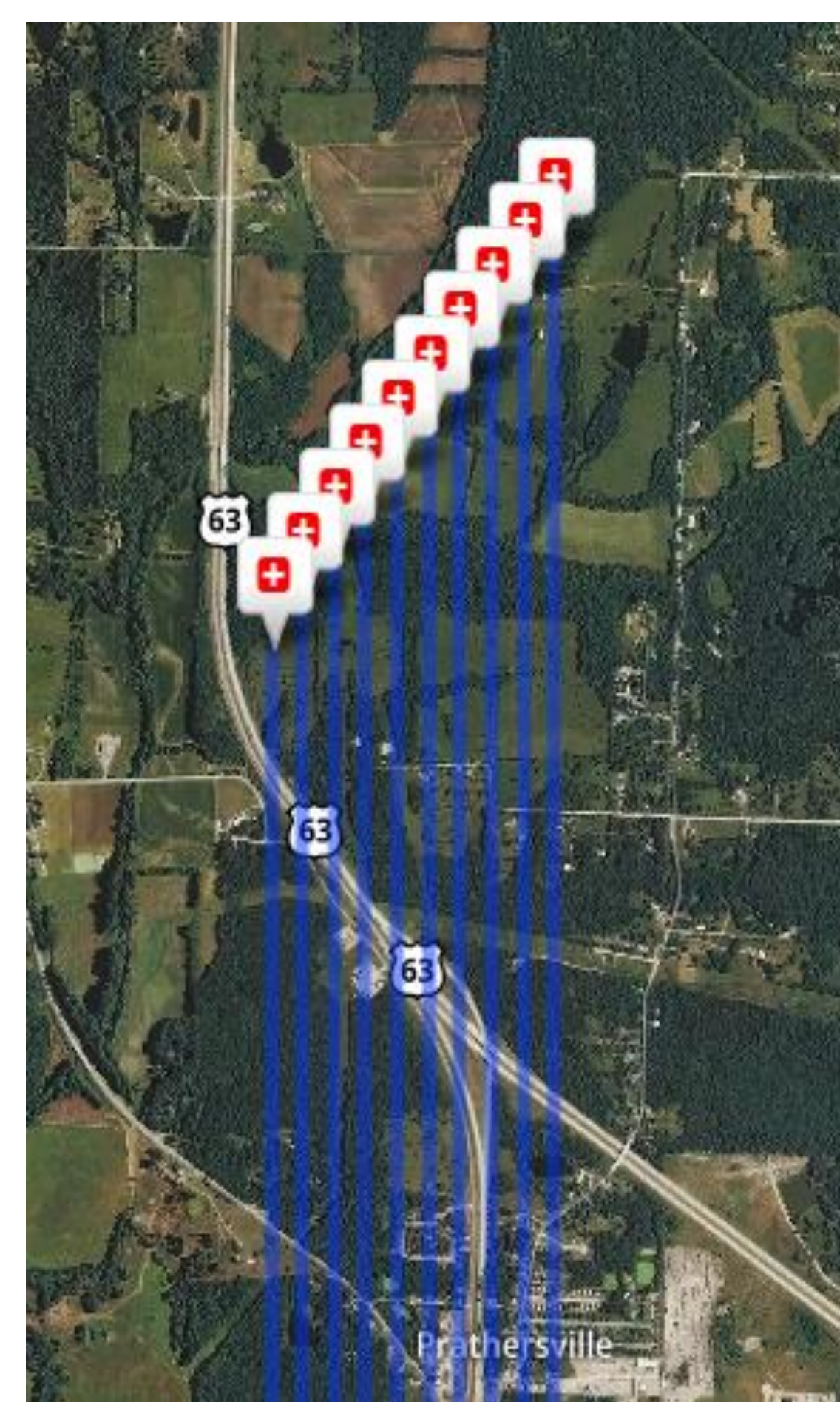## Visualization Objectives

- Real-time location of responders and resources

- Real-time update of incident information

- Minimization of cognitive burden and facilitate information processing

- Allow for better allocation of resources

Markers, Paths, Dynamic Paths

- Mapping Space with Custom Markers
  - Ability to show patient and resource location with descriptions
  - Enhancing usability with 24 custom marker symbols currently used by Task Force 1
  - Ease in replacing and adding markers through a configurable JSON file

- Mapping Space in a Temporal Frame
  - Usage of static paths
  - Creates spatial awareness for complete past events without temporal precision or relativity

- Dynamic Spatiotemporal Filter
  - Ability to select a timespan for desired playback through a time slider
  - A dynamic play/pause button for toggling playback
  - Displays past, present, and future progression of resources

Google Earth View of Garmin Data

Static Geovisualization of Time

- Dynamic playback requires processing time, and relative times cannot be determined from paths

- Geovisualization over time through gradients provides:
  - Complements option of dynamic timeline playback
  - Spatial and temporal information about a scenario without continuous playback
  - Gradients are accessible to color blind users

No Color Blindness

Red Color Blindness

Green Color Blindness

Experiment and Results

- Two search & rescue responders participated in three trials

- Trial One tested the current Task Force 1 Garmin solution, Trial Two tested Panacea with the Mobile View, and Trial Three tested Panacea with Recon Jets

- Transmission of data QR codes through the Recon Jets relied on the internal camera, which produced overexposed images in direct sunlight, and the internal GPS which fell victim to GPS scatter
  - Deemed unfit hardware for this use case

- Users completed a usability survey containing ten questions upon the completion of each trial
  - Measured on the Likert Scale with 1 being strongly disagree and 5 being strongly agree
  - Panacea outperformed or tied with the Garmin in usability in nine of ten categories
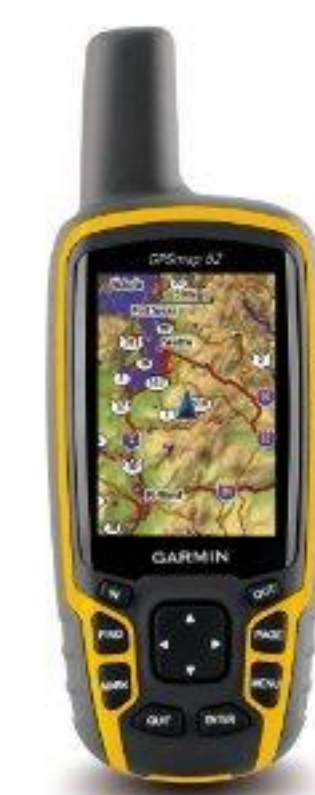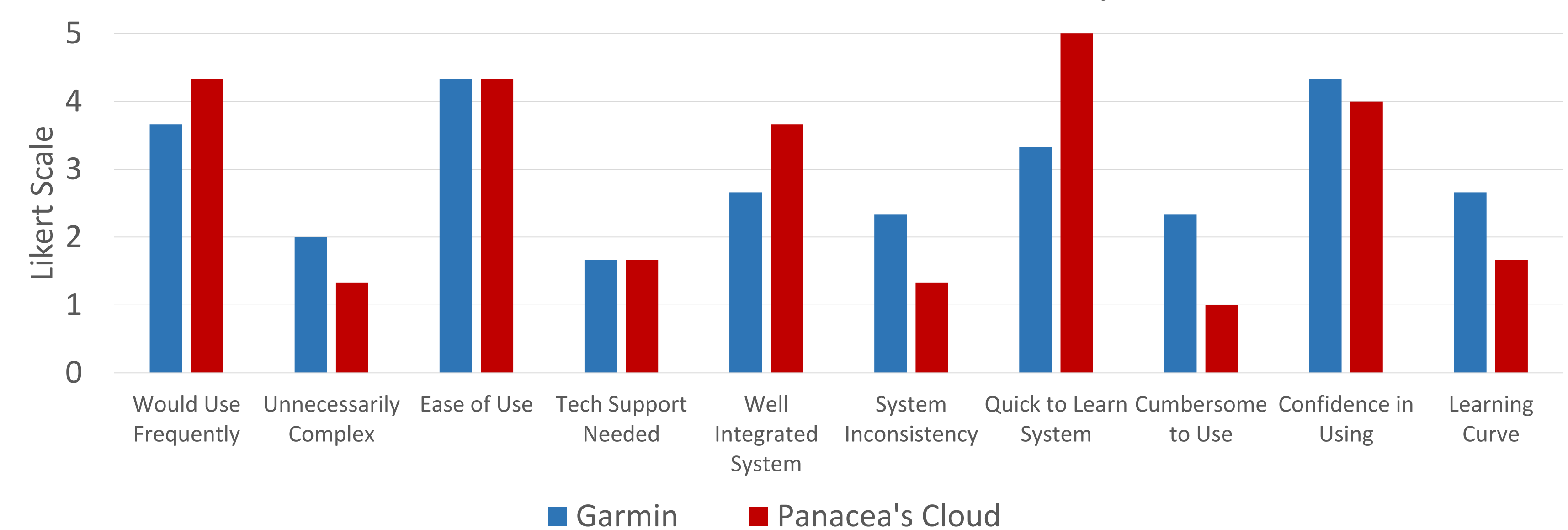
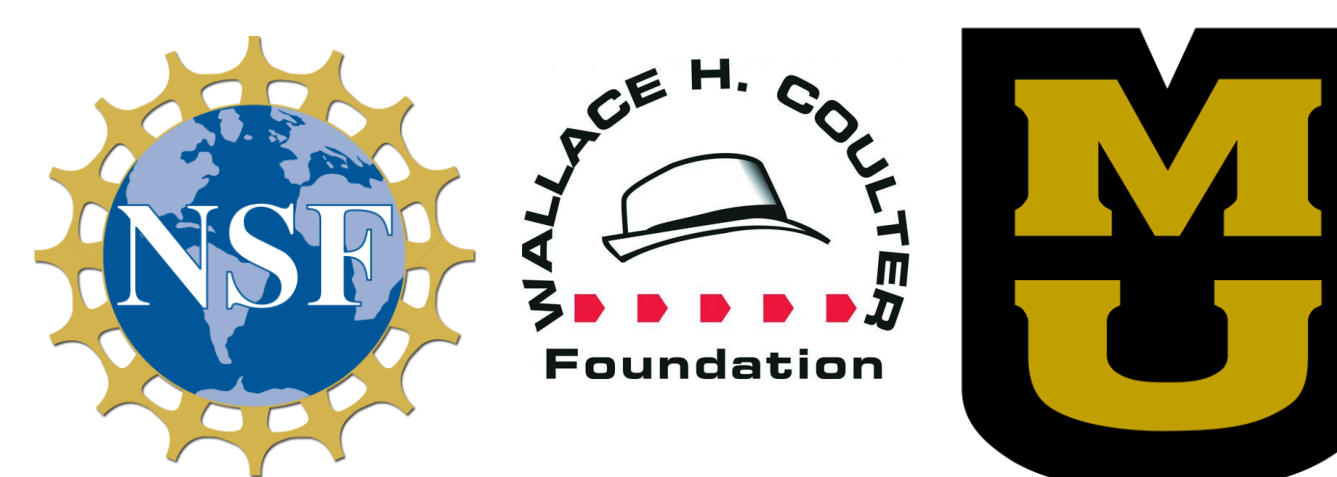Trial One: Garmin System

Trial Two: Mobile System

Trial Three: Garmin System

Panacea's Cloud vs. Garmin Usability

Likert Scale — Would Use Frequently, Unnecessarily Complex, Ease of Use, Tech Support Needed, Well Integrated System, System Inconsistency, Quick to Learn System, Cumbersome to Use, Confidence in Using, Learning Curve

Garmin — Panacea's Cloud

Acknowledgements