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An Information Interface for Disaster Management Professionals - DADm

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Disaster Management Cycle

- Mitigation – Preemptive actions to reduce severity, consequences, and risks to people
- Preparedness – range of critical tasks and activities necessary to build, sustain and to improve operational capability to prevent, protect against, respond to, and recover from disaster
- Response – immediate/ongoing activities and systems to manage the effects of an incident and help reach a stable status for the entity
- Recovery – programs designed to return conditions to a level that is acceptable to the entity. Assisting victims and restore institutions. Rebuilding.

Shonan Meeting 2014 - User Card Stories

- A method to help define what end users will/want to do with interface

- What do they look like?

  As a [user] I want to [action] in order to [goal].

- Prioritize – MoSCoW method
  - Must = Minimum features for product to be useful
  - Should = Not critical but high value and important
  - Could = Nice to have without incurring too much cost
  - Won't = Outside of scope, possible for the future

Key Points of User Card Stories

- Data/information is critical
  - Real-time
  - Updatable
  - Filtered
  - Sharable
  - Continuous
  - Accessible

User Interface Requirements

- Data-centric
  - Collect different data types, but basic information
  - Data is updated and always presents current status
  - Temporal and spatial referenced data
  - Simple, easy to access and interpret
  - User has limited IT experience

- Workspace application
  - Present different types of data (simulation/sensor/crowd)
  - Aggregate/filter data
  - Shareable data
  - Ability to view data individually or overlayed

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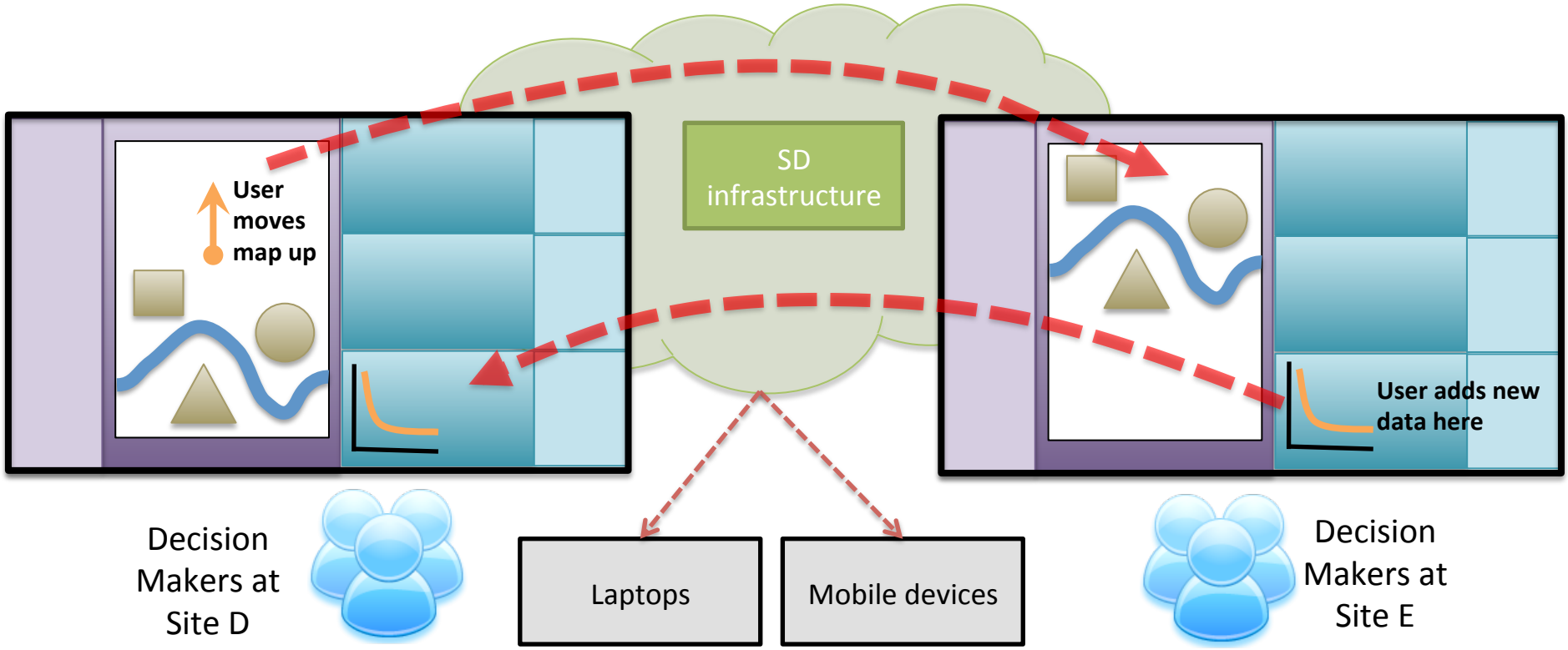
Multisite Visualization Interface



Key Data Requirements
Spatial/temporal or Where/when

- Infrastructure
  - Transportation
    - Roads/bridges intact, congested
  - Power
    - On or off, power station locations
  - Water
    - On or off
  - Gas
    - On or off, fires?
  - Communication
    - Landline and cellular
- Hazards
  - Structural
    - Buildings destroyed
  - Combustible
    - Ongoing fires
  - Water
    - Areas that are flooded and inaccessible
- Health/safety
  - Fire department
  - Police
  - Medical
  - Military

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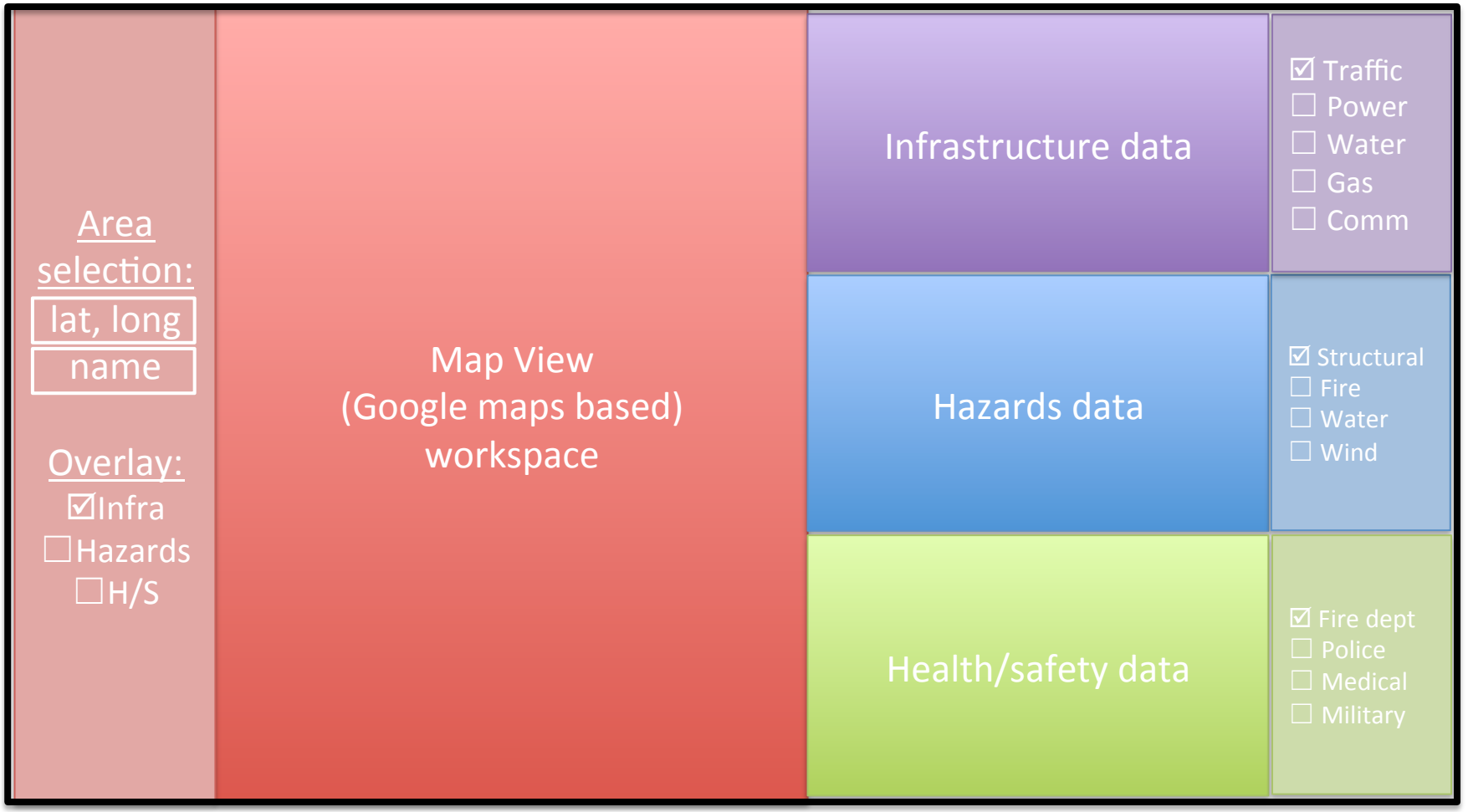
Workspace Concept



DADm - Research Objective

- Deployment of a multi-site visualization tool for disaster management
- Design Objectives
  - Being able to geographically visualize regions of interest
  - Being able to access multiple unique datasets to gauge disaster action choices
  - Selectively view and toggle relevant datasets
- The application needs to be streamlined, straightforward, and transparent to the user

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Methods

- Development on a Shared Collaborative Environment (SAGE2)

- JavaScript
  - Leaflet Map, D3, and Heatmap Libraries
  - Data Broker (JSON datasets)
  - HTML Document Object Model (DOM)

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Application Demo

- Created a working prototype SAGE2 application with a simple user interface
- Allows user to link JSON datasets and tag them with keywords through the data broker
- Users can see both static 2D data and 3D data with the heat map layers
- Show the feasibility of creating a data-intensive application on SAGE2

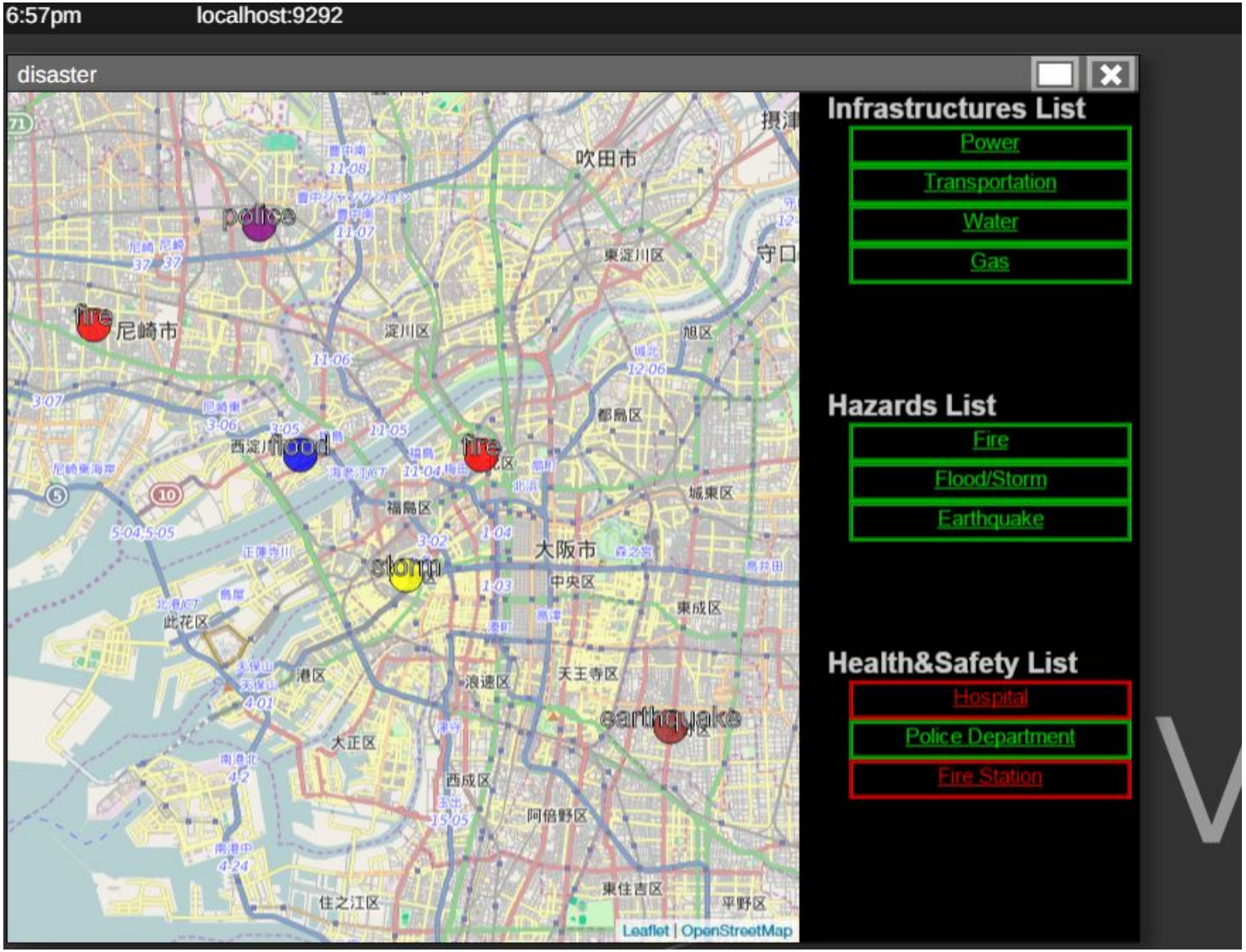

Figure 1: Early renditions of the application with a static UI and sample data

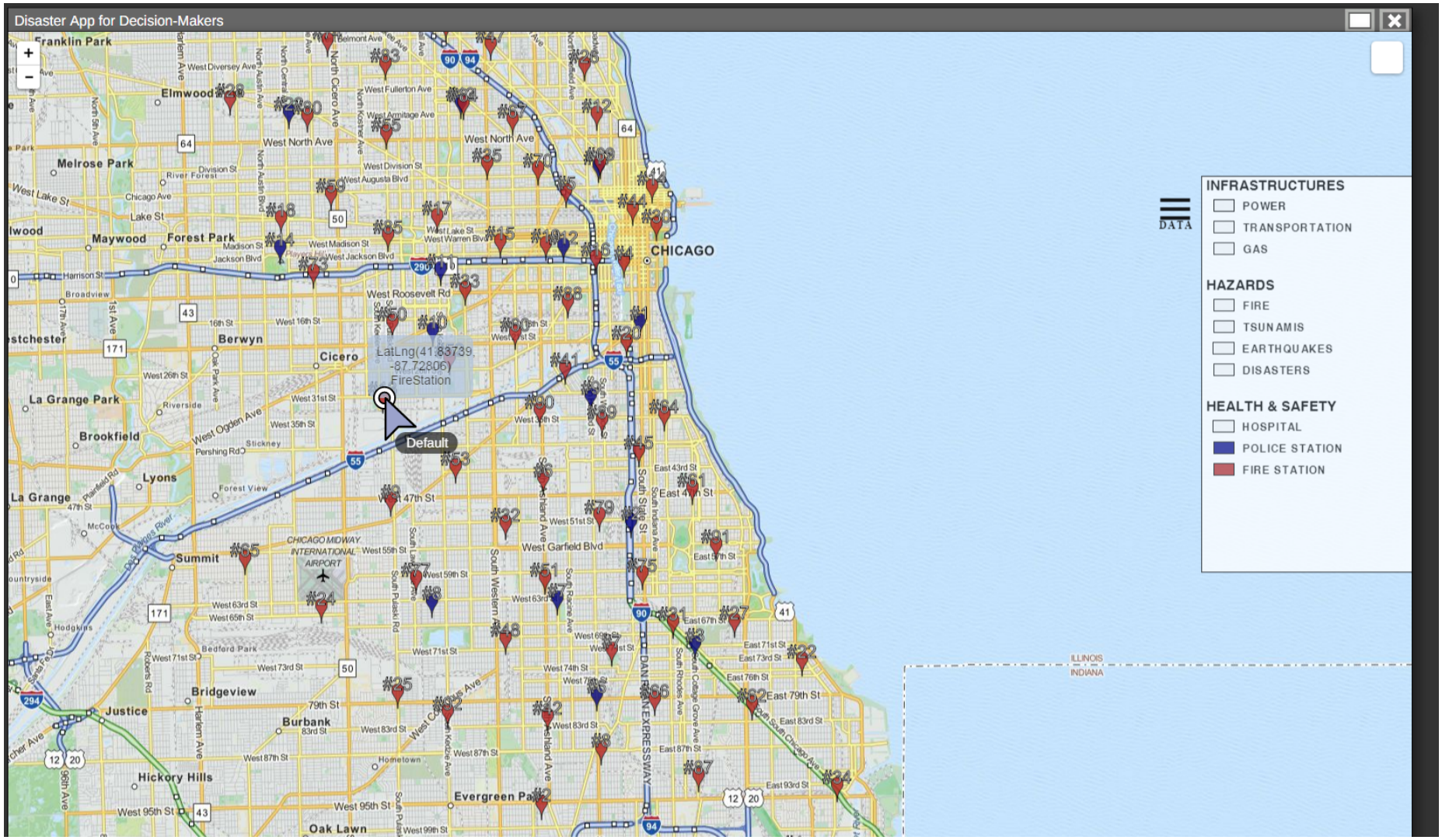

Figure 2: Current rendition of the application overlooking Chicago with Police & Fire Station Data

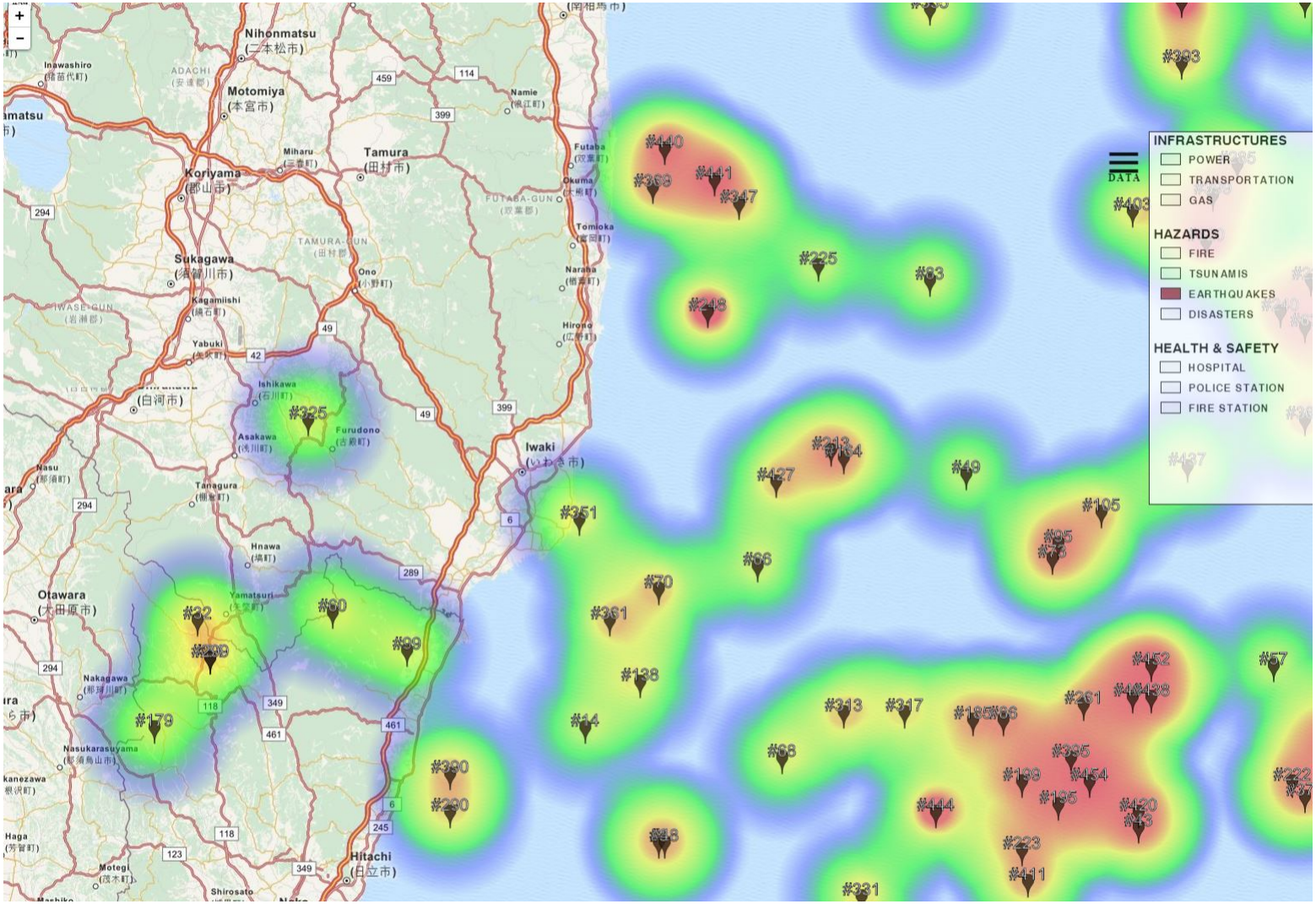

Figure 3: Current rendition overlooking the East Coast of Japan with earthquake disaster data

Conclusion

- SAGE2 is meant to be used as a shared multi-site collaborative environment for viewing and interacting with content.
- DADm is one application of SAGE2 that displays coordinate-specific JSON data based on the user's specifications
- Further development will display disaster-management data in both a more streamlined and effective manner
- No conclusive real-time application due to lack of an available dataset, but as a whole it is a step toward app development in the SAGE2 platform

Future Work

- Tuning the heat map feature and UI improvement
  - Working within SAGE2
- Integration of different types of datasets
  - Open vs. usable
- More advanced data broker
- More detail each data point
- Further testing with real-time data to mimic intended application

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