Standard Unified Modeling, Mapping and Integration Toolkit (SUMMIT)

SAND2011-4241P

Support of a Joint Exercise U.S. - Sweden

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SUMMIT Team

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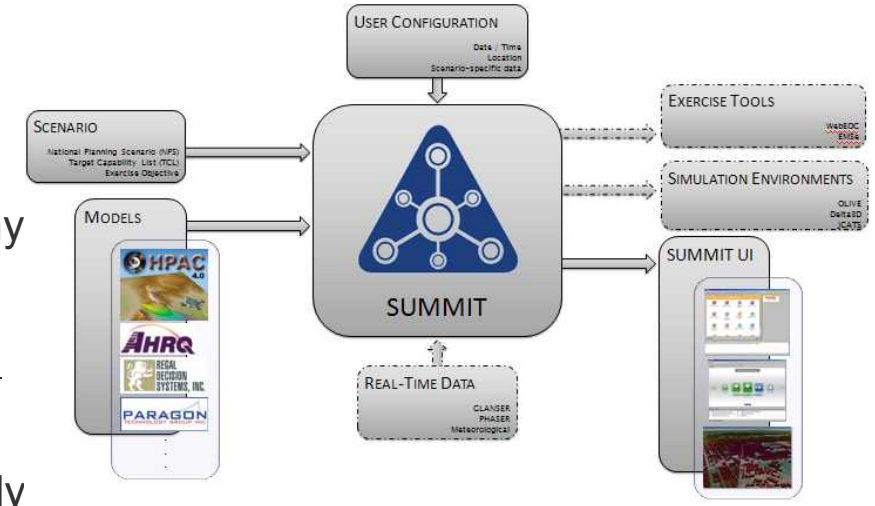
Integrated Mapping, Modeling and Simulation

Research & Development program: Develop and demonstrate a framework for rapidly linking together models and data, and supporting collaboration across user communities (analysts, emergency planners and responders).

Capability under development: SUMMIT

- Distributed framework bringing together users and modeling resources from many locations; access to data/models controlled by resource owners
- Users can discover models, simulations, data, and archived analyses that are relevant to an objective or scenario
- SUMMIT provides "glue" for automatically linking together disparate modeling tools
- SUMMIT saves and manages scenarios and analysis results for evaluation and reuse



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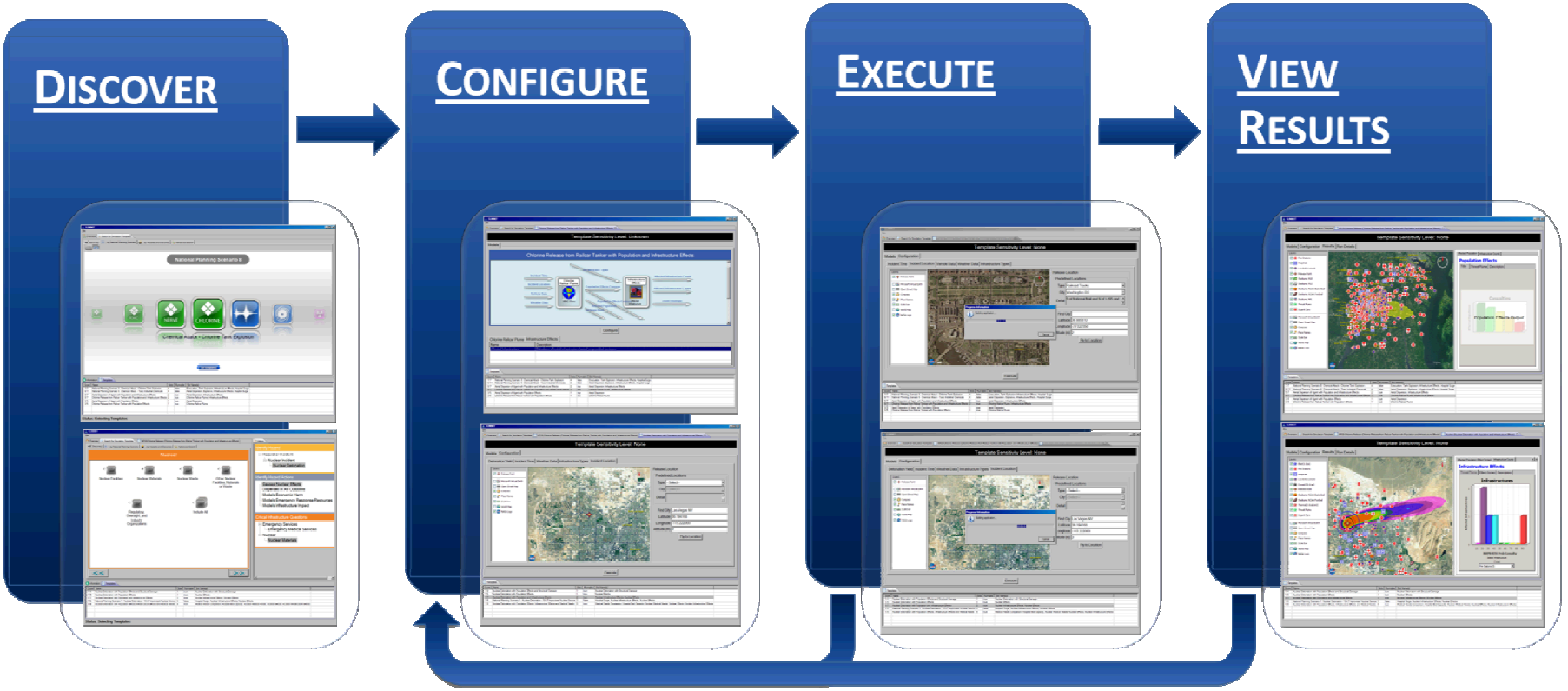
SUMMIT Workflow



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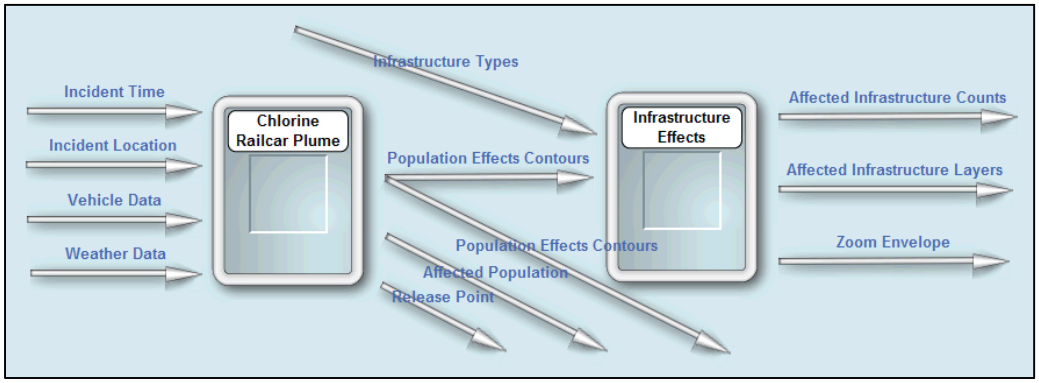
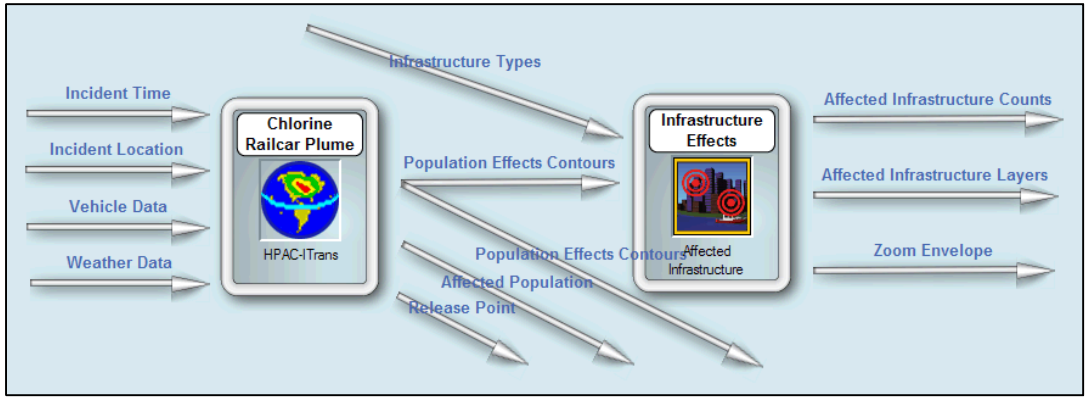
SUMMIT Simulation Template Concept



Generic pattern for linking together models and data.

Each “slot” includes type and format of data inputs and outputs.

Model and data owners will use the SUMMIT Software Development Kit to wrap their tools so they fit within a “slot.” (a software engineering effort)



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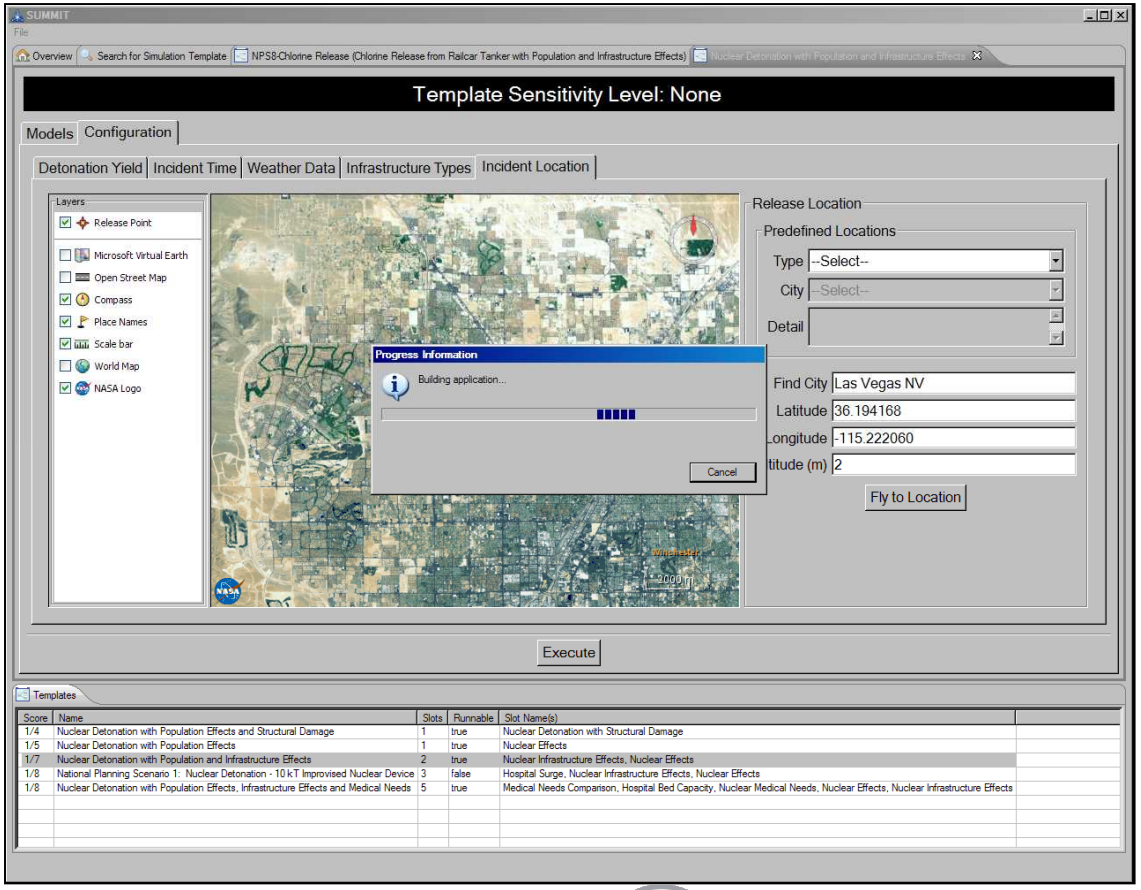
SUMMIT Prototype – Configure and Execute Scenario

If SUMMIT-compliant models are chosen, the user can configure the models (e.g., specify the scenario location, date/time, threat characteristics, etc.)

The system automatically links the models and seamlessly executes them.



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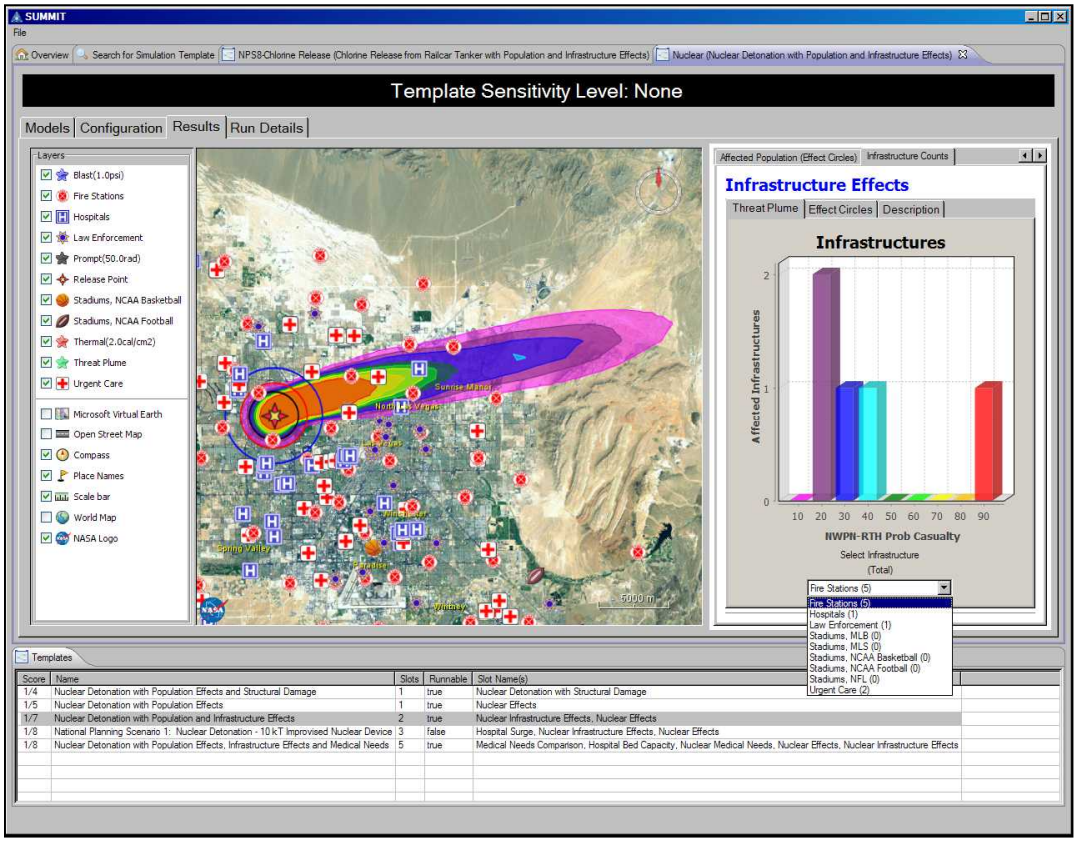
SUMMIT Prototype – View and Manage Integrated Results, Reuse Templates and Models

SUMMIT Simulation Templates also support result integration.

Output from multiple models can be overlaid within GIS systems or displayed in other visualization tools.

Configuration parameters and results are archived and can be easily accessed and rerun.



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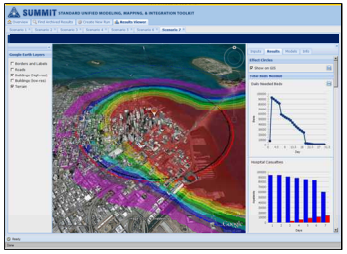
SUMMIT Support for the 2011 National Level Exercise (NLE)

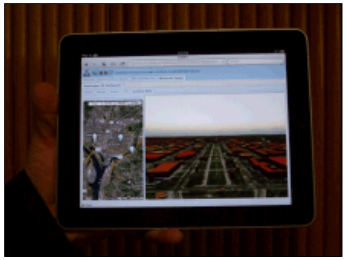
Planners used SUMMIT to generate and refine scenario data

- Linked models to calculate data for scenario
- Model-driven scenario with objective-driven scenario



Controllers used SUMMIT to visualize scenario data

Visualized model output in 2D (GIS) and with charts/graphs, supported common operating picture



Players used SUMMIT to view scenario data in a virtual world

Introduced next-generation immersive visualization tools for exercises

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2011 National Level Earthquake Exercise

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SUMMIT used in "Real Time" in NLE

Exercise participants in Arkansas requested plume modeling for a collateral impact (chemical rail tanker spill).

This was conducted in real time during the exercise. Players were presented with results in the field utilizing the IPAD.

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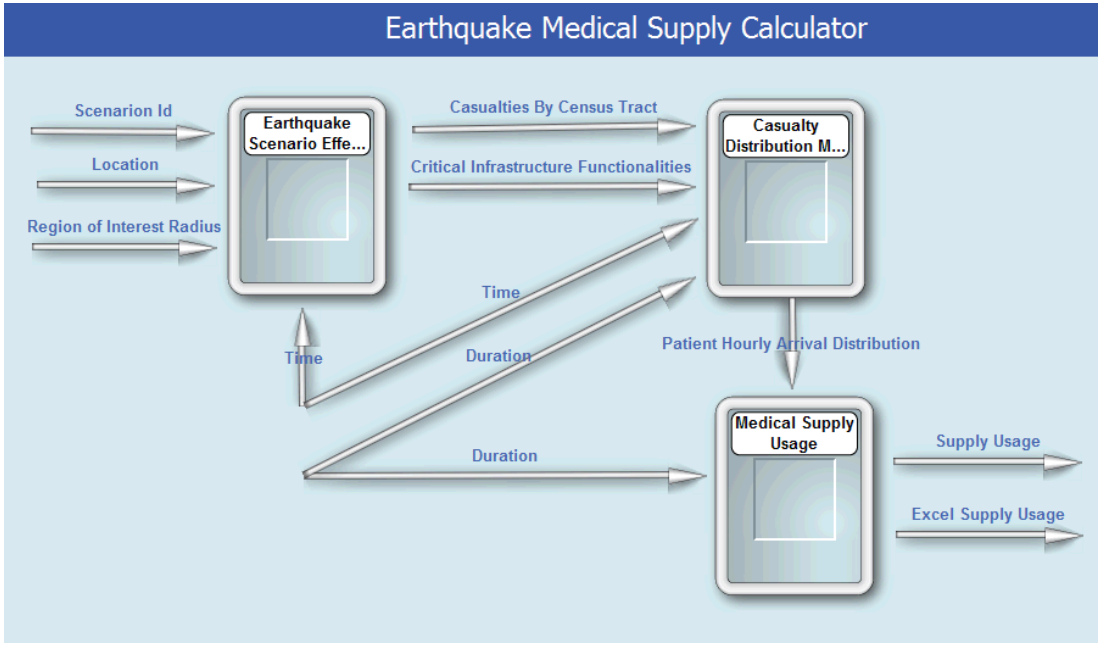
Planners used SUMMIT to generate medical surge data for scenario

SUMMIT linked HAZUS outputs to casualty distribution model and AHRQ Hospital Surge Model.

Casualties from HAZUS were distributed over time to nearest undamaged hospitals. AHRQ Hospital Surge Model calculated medical needs (staffing, supplies, hospital census).



Medical surge data was part of scenario and was utilized by controllers in the master control cell during exercise conduct.

Medical surge data was calculated for all hospitals and medical centers receiving casualties in all 8 states playing in NLE11.

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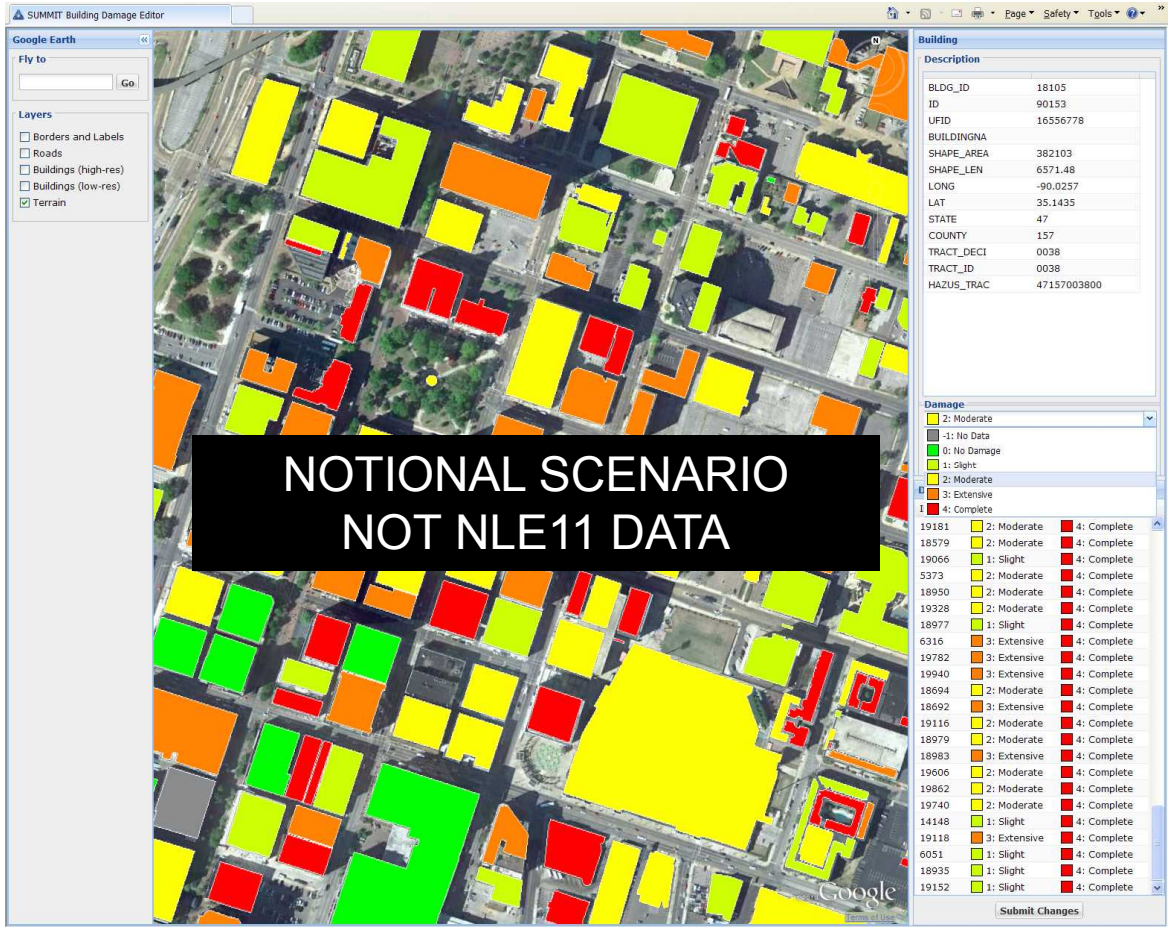
State and local planners used SUMMIT's building damage adjudication tool to refine scenario

SUMMIT generated individual building damage states, based on HAZUS results.

Individual building damage states modified by planners to support exercise objectives.

Adjudicated building damage used in the master control cell during exercise.

Tool was piloted in locations with shaking severity (MMI) > VI and populations > 25,000.



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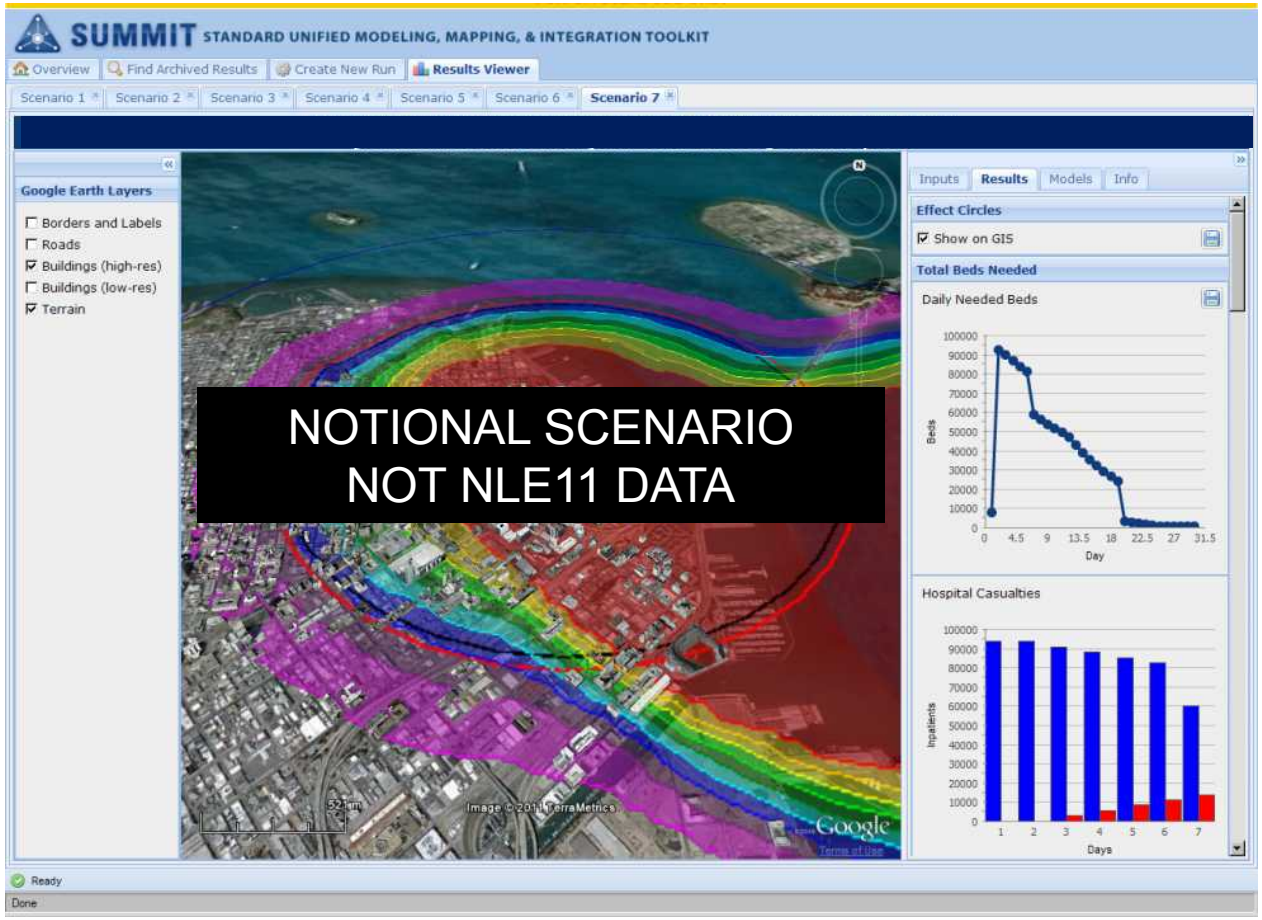
Controllers used SUMMIT to visualize damage and medical surge data

SUMMIT has a results viewer that displayed model output in 2D (GIS) and as charts and graphs.

SUMMIT was used to view HAZUS and medical surge data for all 8 states in the master control cell to support the common operating picture.



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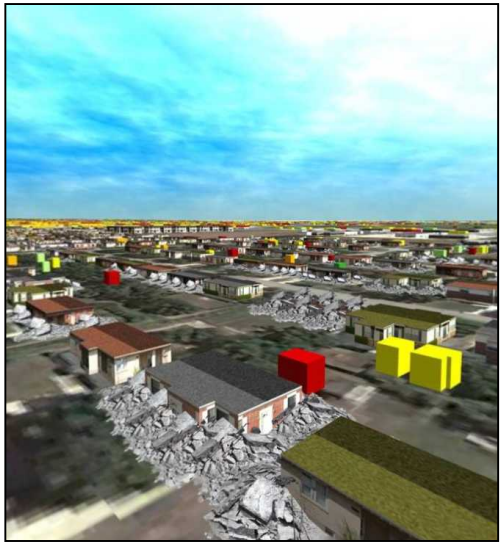
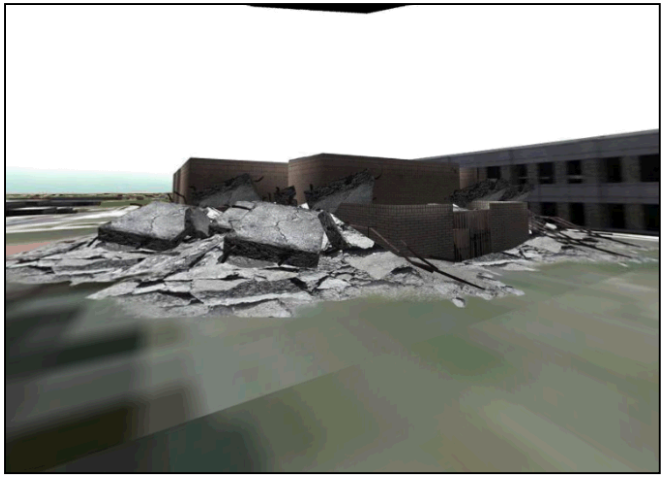
SUMMIT – NLE 11; Mobile Capability

- Utilizing an iPad, First responders were able to develop response considerations in the field:
  - Staging
  - Ingress/egress
  - Security
  - Collateral damages





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U.S. – Sweden Exercise

- Purpose: To experiment and test DHS S&T's SUMMIT and its associated services (modeling and simulation integration, exercise planning, virtual environment, etc) and functionality in a Swedish crisis management environment.
- Objectives:
  - Increase the participants' situational awareness through SUMMIT by visualizing a scenario, exercise injects, and ground truth data.
  - Participants utilize SUMMIT in a command and control environment to process information and rationalize decision-making on a cascade of modeling outputs.

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U.S. – Sweden Exercise

- Current SUMMIT Scenarios:
  - Chemical rail tanker spill
  - Improvised nuclear device
  - Earthquake
  - Biological agent release
- Current Models that can provide international support:
  - Hazard Prediction Assessment Capability (HPAC) – forward plume model
  - Agency for Healthcare Research and Quality (AHRQ) – hospital surge model

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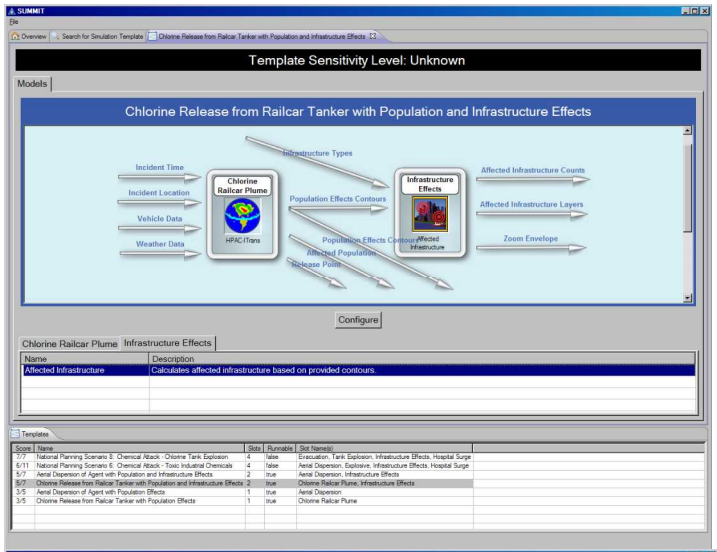
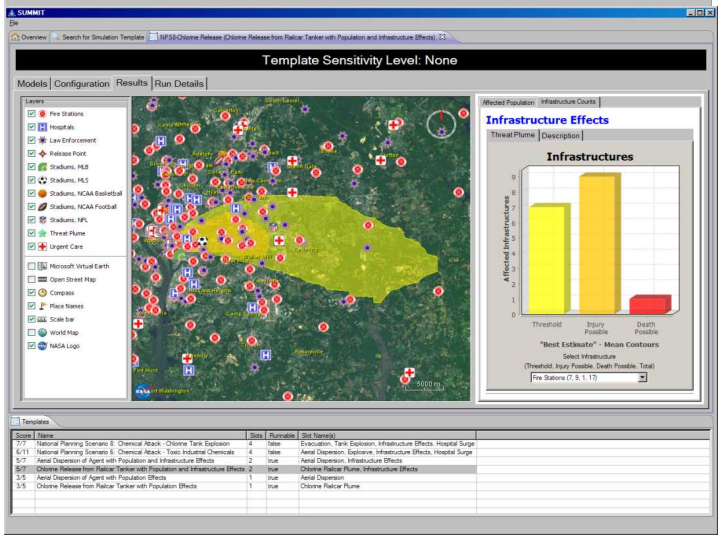
U.S.- Sweden Exercise

- Pre-exercise support with exercise planning team
- Suggested scenario: Rail tanker chlorine derailment
  - Develop scenario and ground truth
    - Utilize different variables (location, release amount, time of day) to determine impacts
    - Provide cascading effects of models:
      - Chemical plume (downwind hazard zones)
      - Populations exposed
      - Casualty estimates
      - Hospital admission estimates and beds needed
  - Export to Google Earth files
  - Provide facilitation questions around modeling outputs to help drive exercise play





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U.S. Sweden Exercise – Next Steps

- Exercise stakeholders / intended audience
- Concurrence on use of Chemical Rail Tanker Scenario
- Area(s) of concern / Location of event
- Population data in affected area
- Critical infrastructure information / data sources

SUMMIT Contact Information

www.dhs-summit.us

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