Train to Respond, Respond as Trained

Enhancing Use of Science-based Tools for Emergency Preparedness and Management

FEMA's Modeling and Simulation Service Line provides modeling, analyses and data to support the exercise and planning process.

Homeland Security
Science and Technology

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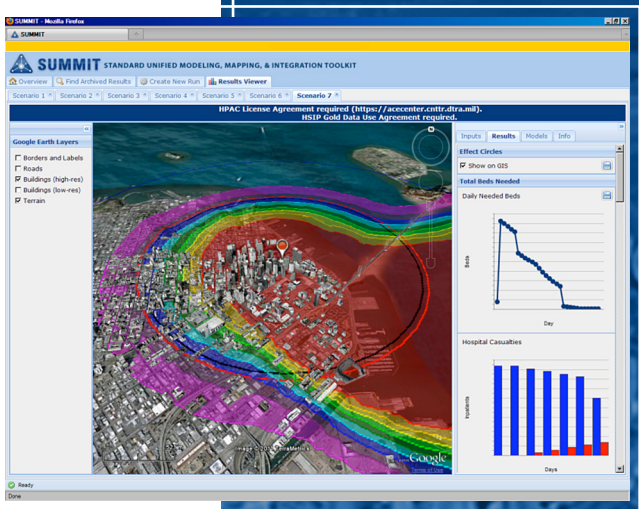
Preparing responders to work within a rapidly evolving, diverse, and multi-jurisdictional environment—often with limited situational understanding—is a major challenge. Maximizing preparedness requires a continuous cycle of activities, from pre-event planning, to training and exercises, to evaluation and improvement. The Standard Unified Modeling, Mapping and Integration Toolkit (SUMMIT) program was created to address this challenge.

The Resilient Systems Division of the Department of Homeland Security (DHS) Science and Technology (S&T) directorate has funded the development of SUMMIT, a software toolkit that enables the emergency management community to access integrated suites of modeling tools and data sources for planning, exercises, or operational response. SUMMIT has been deployed at the Federal Emergency Management Agency (FEMA) National Exercise and Simulation Center (NESC), a congressionally-mandated exercise and simulation resource. Through its Modeling and Simulation (M&S) Service Line, the NESC provides state-of-the-art M&S capabilities and Subject Matter Experts (SMEs) to support nation-wide exercises, training, education, planning and response.

The goal of the SUMMIT program is to enhance the ability of the emergency management community to apply science-based tools to their activities. By creating a collaboration environment that allows linking of "best-in-class" modeling and simulation (M&S) tools and underlying data, SUMMIT aims to decrease the time and cost needed to train for, analyze, and respond to real or potential incidents—while increasing preparedness effectiveness.

SUMMIT allows emergency management personnel to easily and rapidly discover, integrate, configure, execute, and view the results of the nation's M&S resources and related data. These resources help ensure a scientific grounding for exercises and other emergency management activities, while enabling a dynamic view of fast-moving events that allows for analysis of the "what if" trade-offs that are so crucial to effective response during an actual event. Further, SUMMIT offers M&S tool and data providers a standard mechanism for making their resources widely available, providing the nation greater access to a broad range of exercise and planning resources.

Sandia National Laboratories is the principal SUMMIT architect.

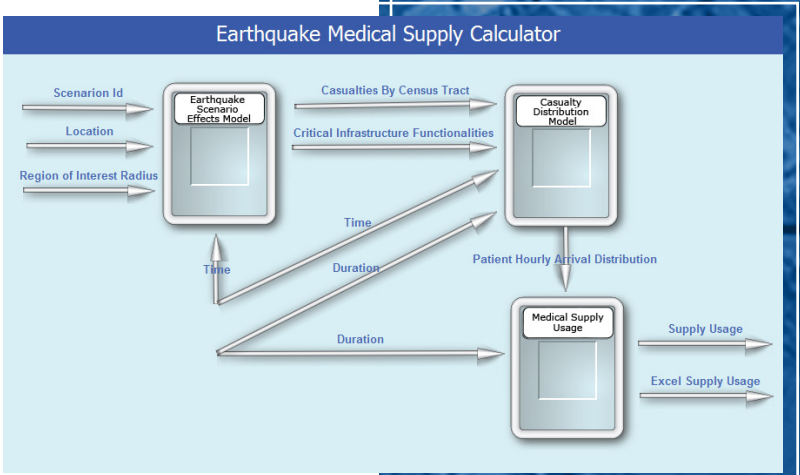


SUMMIT results viewer provides a common operating picture

Providing Value for Federal, State, and Local Emergency Management Personnel

The SUMMIT capability is being transferred to FEMA's National Exercise and Simulation Center (NESC) which will continue to provide the capability to federal, state, and local emergency management personnel through its M&S Service Line.

The SUMMIT capabilities that have been demonstrated at NESC highlight the range of benefits of this system. SUMMIT facilitates development of end-to-end scenarios through its model linking capabilities. For the National Level Exercise 2011 (NLE11), Utah ShakeOut 2012, and the 2012 U.S. Customs and Border Protection Business Disruption Exercise catastrophic earthquake scenarios, for example, SUMMIT linked HAZUS casualty outputs to a casualty distribution model and the AHRQ Hospital Surge Model. This integration enabled planners to calculate the distribution of casualties over time to the nearest undamaged hospitals, medical staffing and supply needs, and hospital census for all hospitals and medical centers receiving casualties in the



SUMMIT templates enable linking of models

eight states participating in NLE11.

SUMMIT also offers specialized tools that enable modeling results to be merged with actual or other non-modeling data. For example, in FEMA Region 2's 2013 Blue Surge Tsunami Exercise and Florida's 2013 Statewide Hurricane Exercise, planners used SUMMIT to link data from different models to statistically calculate and display damage to individual buildings. Then, using SUMMIT's "building adjudication tool", planners could override some of the model results to tailor building damage to better align with exercise goals—thus creating scenarios that are science-based, yet objective-driven. This tool could also be integrated with actual response operations to create modeling estimates of building damage prior to the receipt of damage assessment reports, and then gradually replace these estimates with incoming real data. This would give emergency responders access to both modeling estimates and real data in one view.

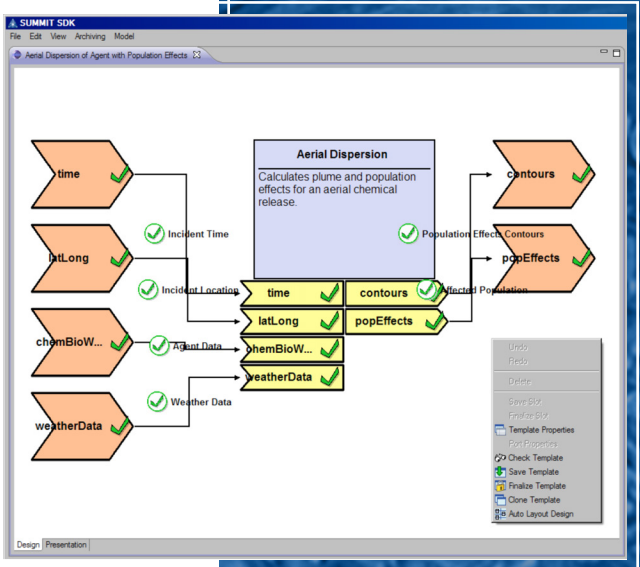
SUMMIT building adjudication tool provides an editable visualization of building damage data

In addition, SUMMIT demonstrates the potential of enhanced visualization of scenarios and data. SUMMIT contains a results viewer that allows exercise controllers to visualize SUMMIT-linked data in enhanced formats, such as in a combination of 2D (GIS), 3D, and charts/graphs. This common and enhanced view facilitates communication and consistency in the control area.

Finally, SUMMIT archives scenarios and standardizes lessons-learned into an enterprise system, enabling easy reuse of modeling and simulation capabilities and results across jurisdictions and over time.

Providing Value for Model Owners

Through use of the SUMMIT Software Development Kit (SDK), model and simulation developers can make their model SUMMIT-compliant with an interface that allows the SUMMIT server to communicate with the model. This standardization of models and data has many advantages for the M&S development community. First, making a model SUMMIT-compliant enforces conformance with a community-driven data standard, which allows for easy data exchange with other SUMMIT-compliant models and software toolkits. Further, models that are SUMMIT-compliant will have greater exposure and usage within the emergency management community, through SUMMIT's M&S discovery process. This process leverages a tagging system that is populated as part of the SUMMIT-compliance process, allowing users to discover all models and data sets applicable to their scenario.



SUMMIT SDK facilitates model "wrapping"

Users and Partnerships

To date, SUMMIT has provided modeling and simulation support to 14 federal, state and regional exercises and operational planning efforts including: National Level Exercises 2011 and 2012; FEMA Region 2 Blue Surge Tsunami exercise 2013; Florida Statewide Hurricane Exercise 2013; Utah Shakeout Earthquake Exercise 2012; Anaheim/Santa Ana Urban Area Threat and Hazard Identification and Risk Assessment (THIRA) planning process 2012; Presidential inauguration planning 2012; and a US-Sweden international exercise. DHS S&T continues to both extend SUMMIT's capabilities (e.g., advanced technology development to support planning operations); and expand SUMMIT's applications (e.g., development of a SUMMIT capability in Sweden).

Please visit www.dhs-summit.us for more information or to request an account.

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