SAND2011-4261P

SUMMIT SUPPORT OF NLE 11

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Homeland Security Seminar

June 20, 2011

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IMMS BACKGROUND

Guiding Doctrine

FEMA

H. R. 5441

One Hundred Ninth Congress
of the
United States of America
AT THE SECOND SESSION

An Act

TITLE I

DEPARTMENTAL MANAGEMENT AND OPERATIONS

SEC. 664. NATIONAL EXERCISE SIMULATION CENTER.

The President shall establish a national exercise simulation center that—

(1) uses a mix of live, virtual, and constructive simulations to—

(A) prepare elected officials, emergency managers, emergency response providers, and emergency support providers at all levels of government to operate cohesively;

(B) provide a learning environment for the homeland security personnel of all Federal agencies;

(C) assist in the development of operational procedures and exercises, particularly those based on catastrophic incidents; and

(D) allow incident commanders to exercise decision-making in a simulated environment; and

(2) uses modeling and simulation for training, exercises, and command and control functions at the operational level.

The White House
President George W. Bush

For Immediate Release
Office of the Press Secretary
December 17, 2003

the White House
President George W. Bush

For Immediate Release
Office of the Press Secretary
December 17, 2003

December 17, 2003 Homeland Security Presidential Directive/Hspd-8

Subject: National Preparedness

emergencies.

(b) The term "Federal departments and agencies" means those executive depart-ments enumerated in 5 U.S.C. 101, and the Department of Homeland Security; independent establishments as defined by 5 U.S.C. 104(1); Government corporations as defined by 5 U.S.C. 103(1); and the United States Postal Service.

(c) The term "Federal preparedness assistance" means Federal department and agency grants, cooperative agreements, loans, loan guarantees, training, and/or technical assistance provided to State and local governments and the private sector to prevent, prepare for, respond to, and recover from terrorist attacks, major disasters, and other emergencies. Unless noted

Homeland Security
Science and Technology

National Exercise Program (NEP) Overview

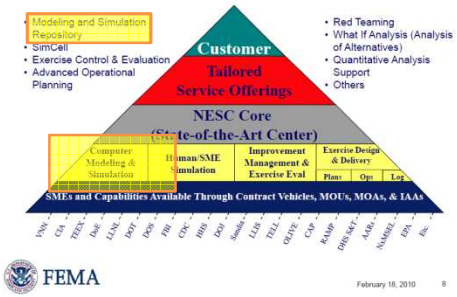
August 2009

FEMA

NESC Foundation & Organiza

FEMA

NESC Business Model



FEMA

February 10, 2010 8

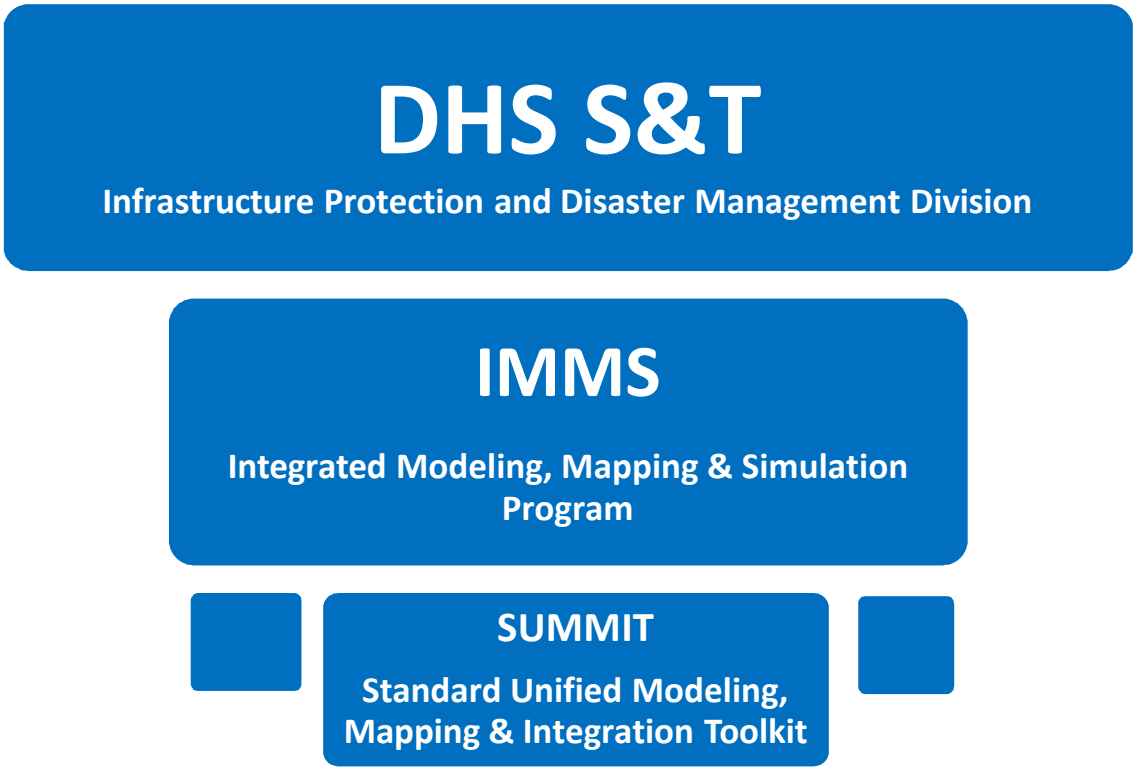
Incident Management

DHS Leads: Federal Emergency Management Agency and Office of Emergency Communications

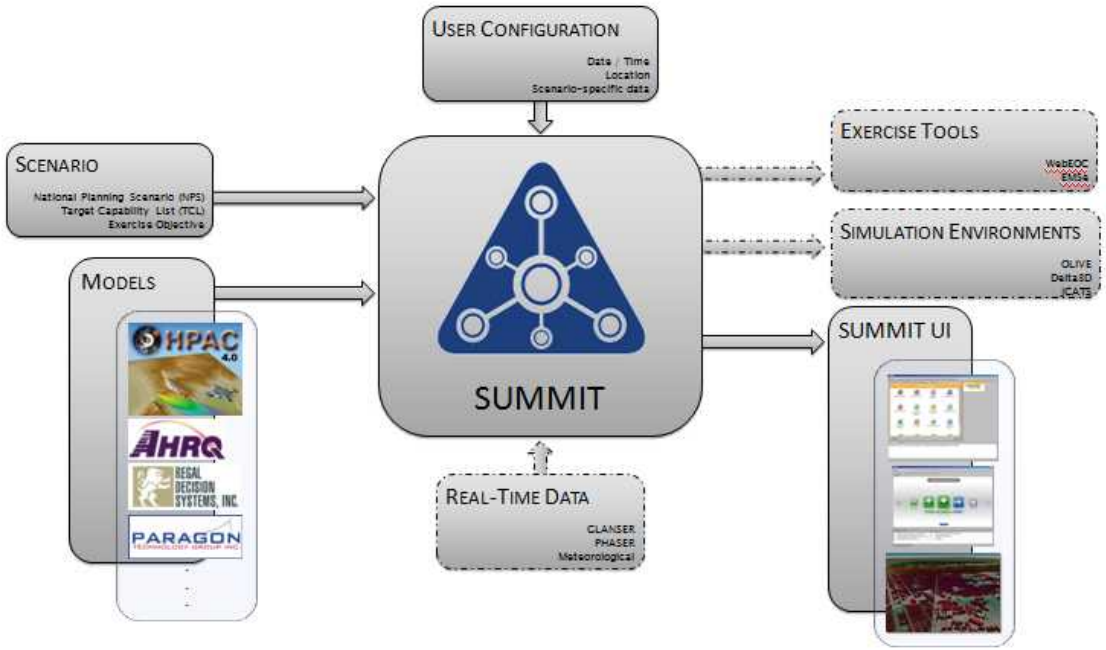
Representative Technology Needs

- Integrated modeling, mapping, and simulation capability—*In particular, an integrated and simulation-based incident planning and response capability to analyze all-hazard disaster response and recovery operations, tactics, techniques, plans, and procedures for use in a real-time environment for simulation-based training* (Infrastructure & Geophysical Division)

IMMS/SUMMIT Structure



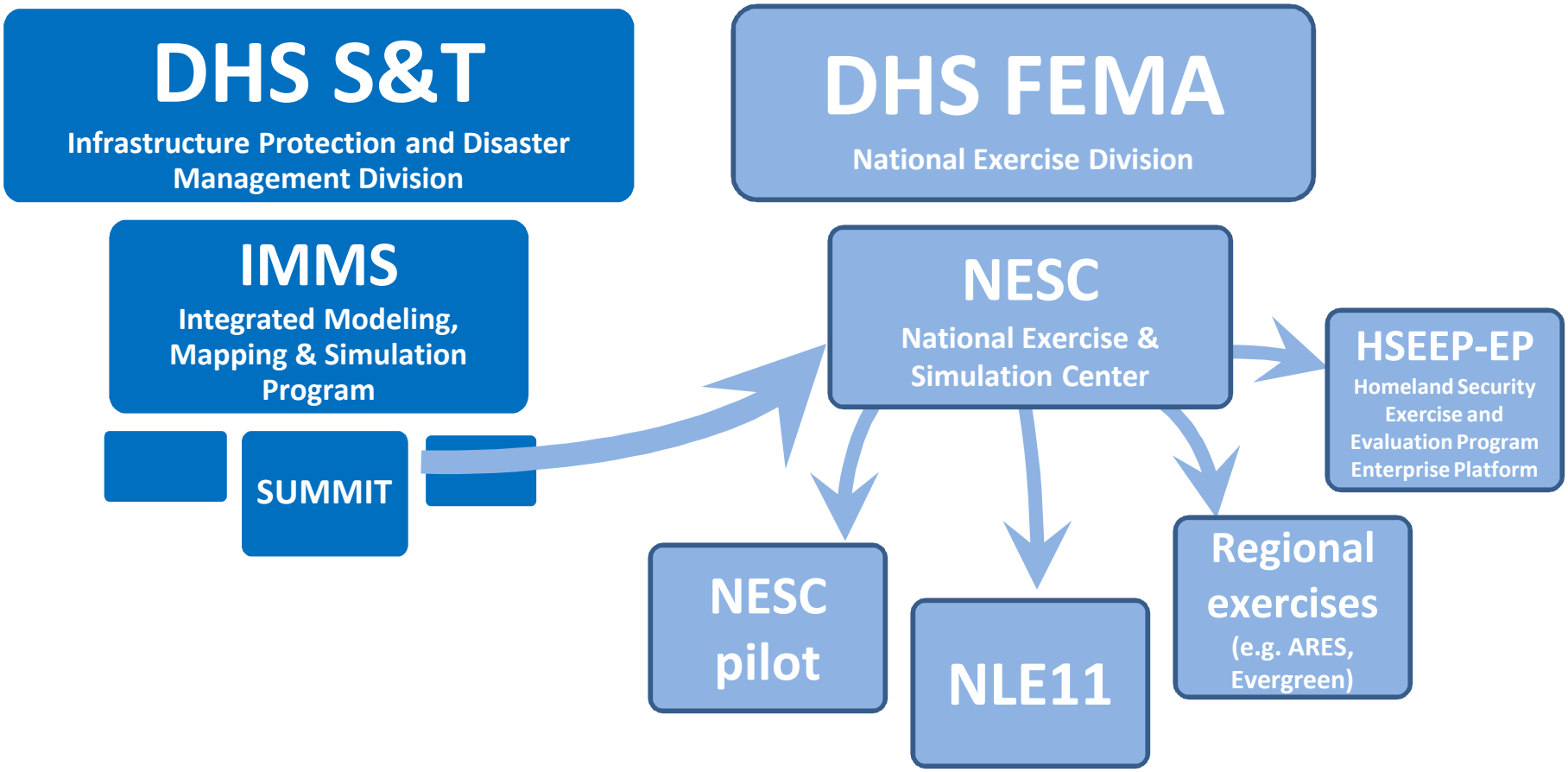
SUMMIT COMPONENTS



Mission Needs:

The emergency preparedness community needs reliable access to, and ability to generate science-based information and data that supports evolving emergency planning, exercises and response operations, and that is consistent, readily interpretable, secure, and easy to share.

SUMMIT Partnership Between S&T and FEMA



Pilots and Exercise Engagement Shape National Exercise Doctrine and SUMMIT Development

Analysis Team is answering:

- What are the nation's gaps in M&S capability to support emergency preparedness?
- What type of system would fill these gaps?
- How and when should it be used, by whom?
- How to build momentum for its transition and usage?

Determination of Mission Needs and Capability Gaps in Emergency Preparedness	• Analysis of current state M&S capability • Synthesis and prioritization of needs/gaps
Requirements Gathering through Field Application and Testing	• Support to National Level Exercises • Pilot at FEMA National Exercise and Simulation Center • Regional Exercises: ARES, WARRP, etc.
Identification and Refinement of System Functional Capabilities	• Prioritizing system capabilities • Scoping system capabilities to address needs/gaps • Models acquisition strategy
Development of Guidance for FEMA and the HSEEP Exercise Process	• ConOps • Transition Plan • Insertion into the HSEEP Toolkit

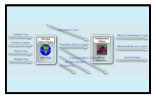
SUMMIT PILOT EFFORTS WITH FEMA

National Exercise & Simulation Center (NESC) Pilot


Scenario Support


Data Visualization


Enhanced Realism


Reusability

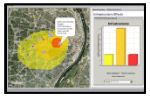
Federal Tier 1 Exercises

National Level Exercise 2010 (NLE 10) - IND


Scenario Support

National Level Exercise 2011 (NLE 11) - Earthquake


Scenario Support

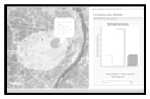

Data Visualization


Enhanced Realism

Regional Exercises (planned)

ARES - Anthrax
WARRP - Anthrax, Mustard, RDD
Evergreen or ShakeOut - Earthquake


Scenario Support


Data Visualization


Enhanced Realism


Reusability

NLEs: White House directed, Congressionally mandated (formally TOPOFFs)

Participants: Federal department and agency senior officials

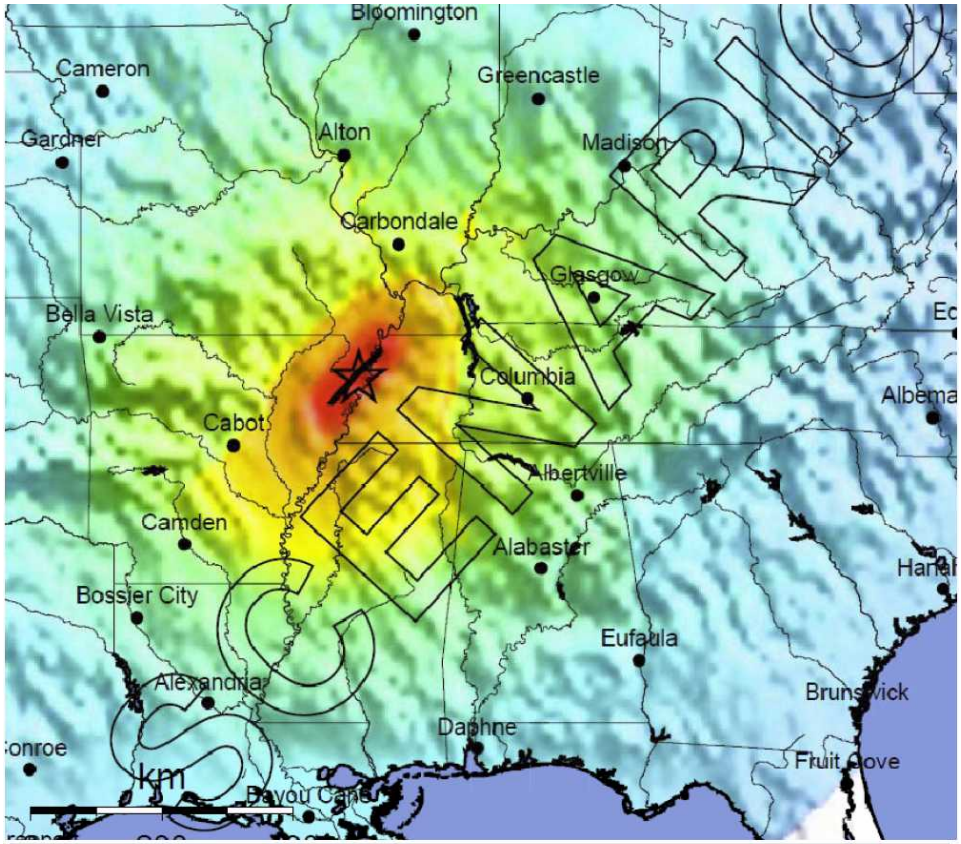
Conduct: Exercise key operational elements

Coincident: Complementary exercises (state/local, federal)

Objectives: assess response and recovery capabilities nationally and regionally in

- Communications
- Critical resource logistics and distribution
- Mass care (sheltering, feeding and related services)
- Medical surge
- Citizen evacuation and shelter-in-place
- Emergency public information and warning
- Emergency operations center (EOC) management
- Long term recovery

NLE 11 Scenario:
Catastrophic Earthquake in New Madrid Seismic Zone



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

TOP LESSONS LEARNED

- To enable full integration in exercise control and evaluation, there is a need to model/ingest player actions and decisions
- Data acquisition, storage, and accessibility is complex but also necessary for mod/sim, requiring NESC to design a long-term data strategy
- For successful integration of mod/sim into an exercise, a mod/sim SME must be a core member of the planning process/team at federal and regional level
- A shift in exercise culture will be necessary to accept and fully utilize mod/sim
  - There is a need for educating the exercise community about the role of mod/sim to create a pull for capabilities (currently there are more informational queries than true requests to use capabilities)
  - Training exercise planners, players, evaluators about how to utilize mod/sim in their exercise will be critical

- Response: There is a pull, from FEMA senior leadership to boots-on-the-ground, for SUMMIT to provide operational support

NLE 11 SUMMIT PILOTS

Jonesboro, AR

Portable Visualization (iPad) Pilot

iPad – virtual building damage on-scene

National Capital Region

Master Control Cell (MCC) Support

SUMMIT client – ground truth visualization

3D client – Jonesboro building damage in virtual environment

Pulaski County (Little Rock), AR; Jonesboro, AR; Shelby County (Memphis), TN; DeSoto County, MS

Scenario Adjudication Pilot

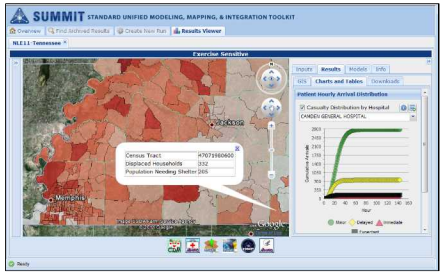
Adjudication tool –modification of building damage

SUMMIT IS PROVIDING NEXT-GENERATION EXERCISE CAPABILITIES TO NLE11

Planners use SUMMIT to generate and refine scenario data

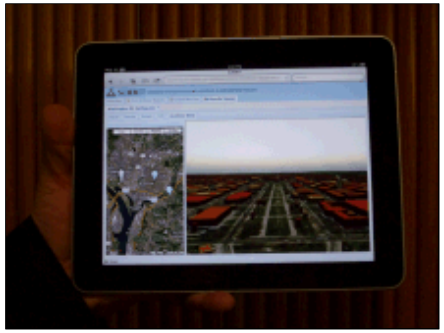
Linking models to calculate data for scenario

Bridging model-driven scenario with objective-driven scenario



Controllers use SUMMIT to visualize scenario data

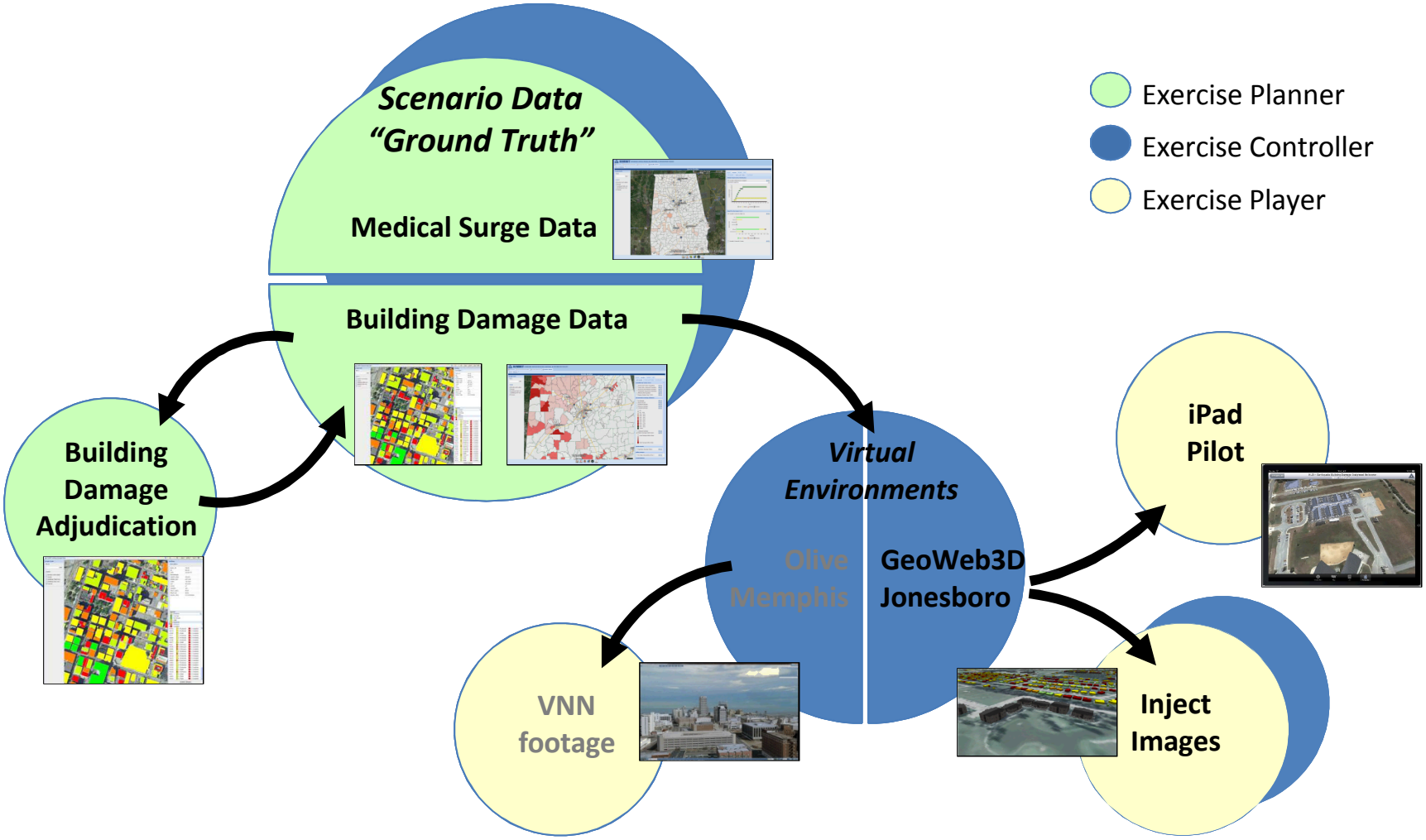
Visualizing model output in 2D (GIS) and with charts/graphs, supporting **common operating picture**



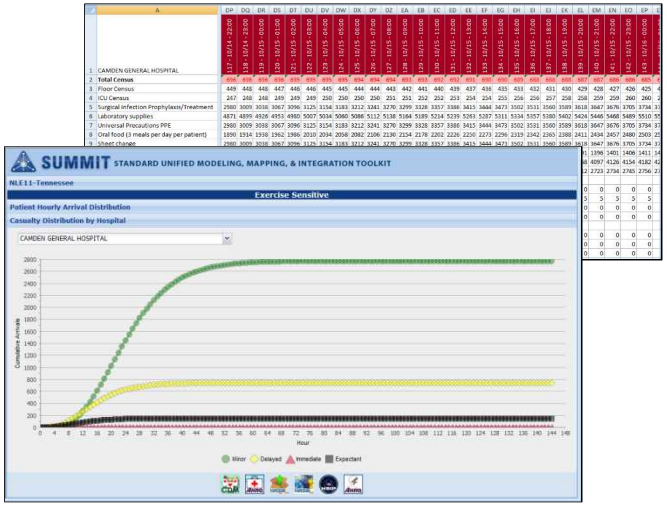
Players use SUMMIT to view scenario data in a virtual world

Introducing **next-generation immersive visualization tools** for exercises

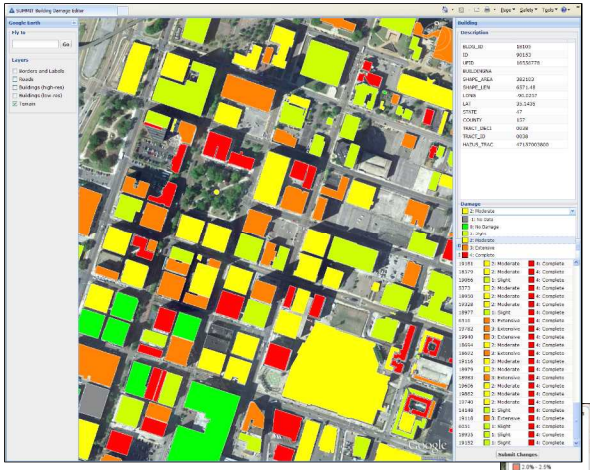
SUMMIT DATA/CAPABILITIES MAP



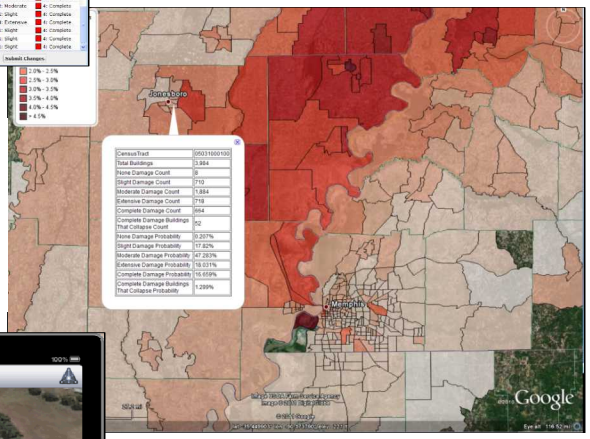
SUMMIT PRODUCTS DEVELOPED FOR NLE 11



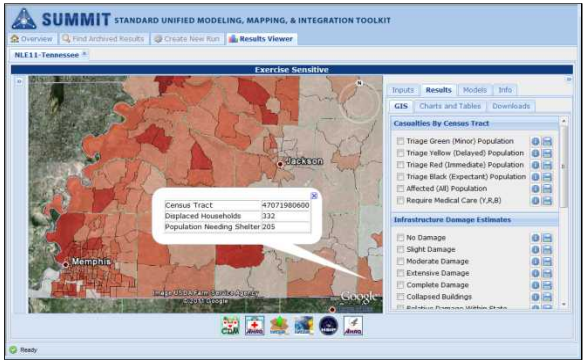
Medical surge needs
(334 hospitals, 8 states)



Building damage
Adjudication Tool for
scenario refinement



Building damage
KML layers for
control, simulation



Results Viewer for Trusted Agents
and for Master Control Cell

Virtual building damage
iPad app

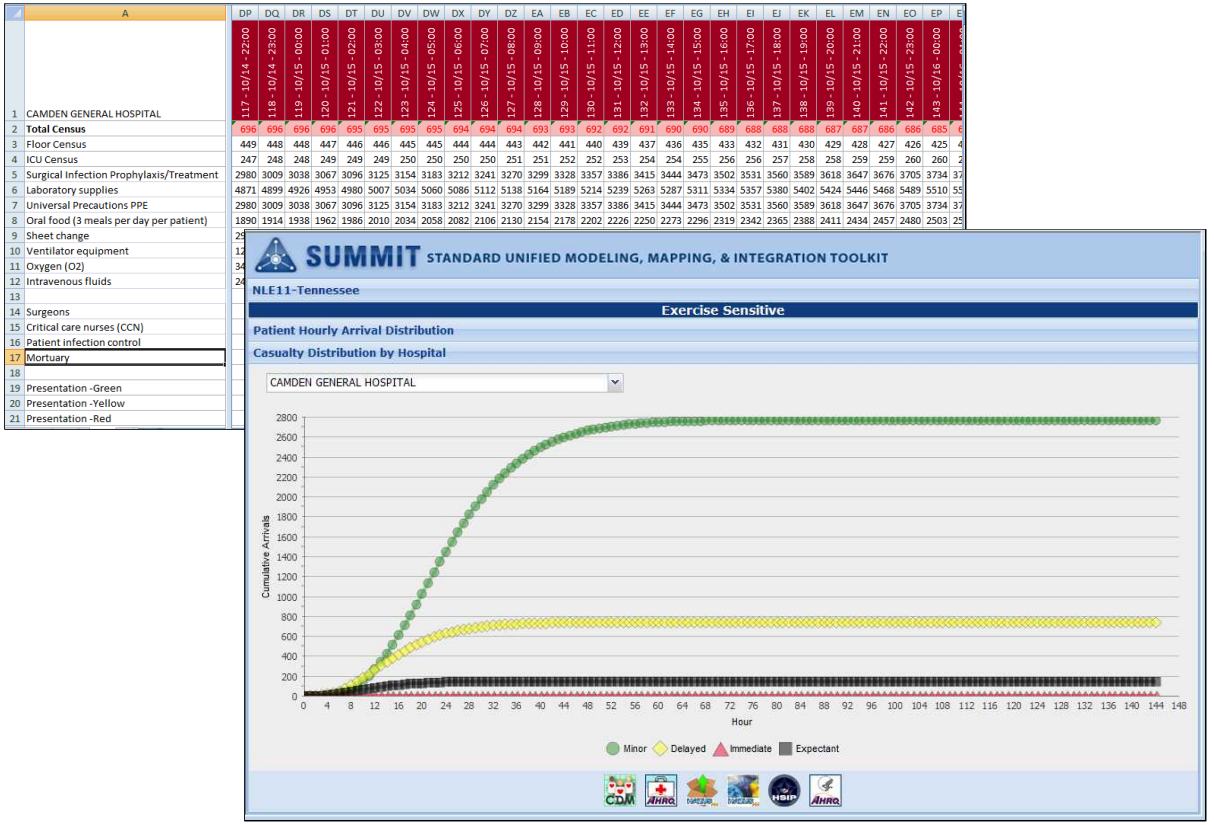
SUMMIT MOD/SIM PRODUCT REQUESTS IN MCC

Product	Recipient	Usage
Casualty count by county for Illinois	State of Illinois, Curt Mueller	For inclusion in Governor's report to POTUS
Collapsed building data (jpg, kmz, lat/lon of collapsed buildings) for Memphis	ESF 9 (Urban Search and Rescue) control	Determined parts of city that would need USAR teams, defined grids that USAR control used to create injects.
Building damage near Paducah, KY (kmls)	ESF 9 (Urban Search and Rescue) control	Determine assignments for USAR teams on the ground
Casualty counts by county for each state	ESF 5 (emergency management) controller/simulator	Input to Urban Search & Rescue model to determine number and type of rescues by building structure and USAR team composition.
Patient arrival and medical resources for 4 major hospitals in Memphis	ESF 7 (logistics management and resource support) control	Used to determine total resource requirements
Casualties for Shelby county	Exercise control	Response to local request to stop presentations of casualties to hospitals
Chemical Plume Modeling with Hospital Casualty Estimates	Craighead County Emergency Management and Jonesboro Fire Department – HAZMAT	What-if discussions on public health assessment/impacts, potential critical infrastructure impacted, first responder safety, staging area for asset deployment, hospital resource capacity and impact.
Casualty distribution data by state Cumulative casualties for each hour of exercise Casualties by operational period	Exercise Situation Unit (Situational Awareness)	Overall exercise control and operational period briefings. Evaluation of exercise (comparison of ground truth to player reporting)
Casualty data for all states (using BBC)	Faith-based organizations / My Social Media	Used to determine needs for faith-based organizations and to create content for My Social Media
Shelter needs, casualty estimates, building damage: MO, AR, IN	Faith-based organizations / My Social Media	Used to determine needs for faith-based organizations and to create content for My Social Media

SUMMIT GENERATED MEDICAL SURGE DATA FOR ALL 8 STATES

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 **used by controllers in MCC** during exercise conduct.

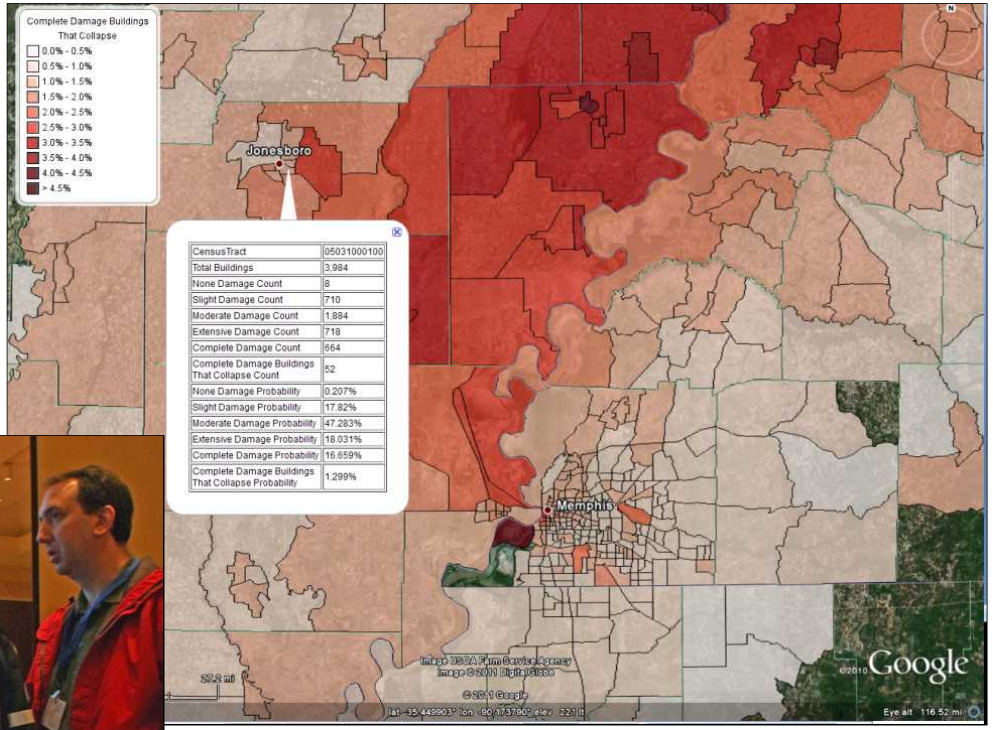
Medical surge data was **calculated for** all hospitals and medical centers (334) receiving casualties in **all 8 states playing in NLE11**.

SUMMIT PRODUCED BUILDING DAMAGE KML LAYERS TO SUPPORT ASSET REQUESTS AND ASSESSMENTS

Extended HAZUS capability to compute "collapsed" buildings

KML layers were included in the Master Control Cell master Google Earth display

Supported simulated asset requests, damage assessments, and Urban Search & Rescue control



SUMMIT Team showing building collapse data to ESF 9 (Urban Search & Rescue)

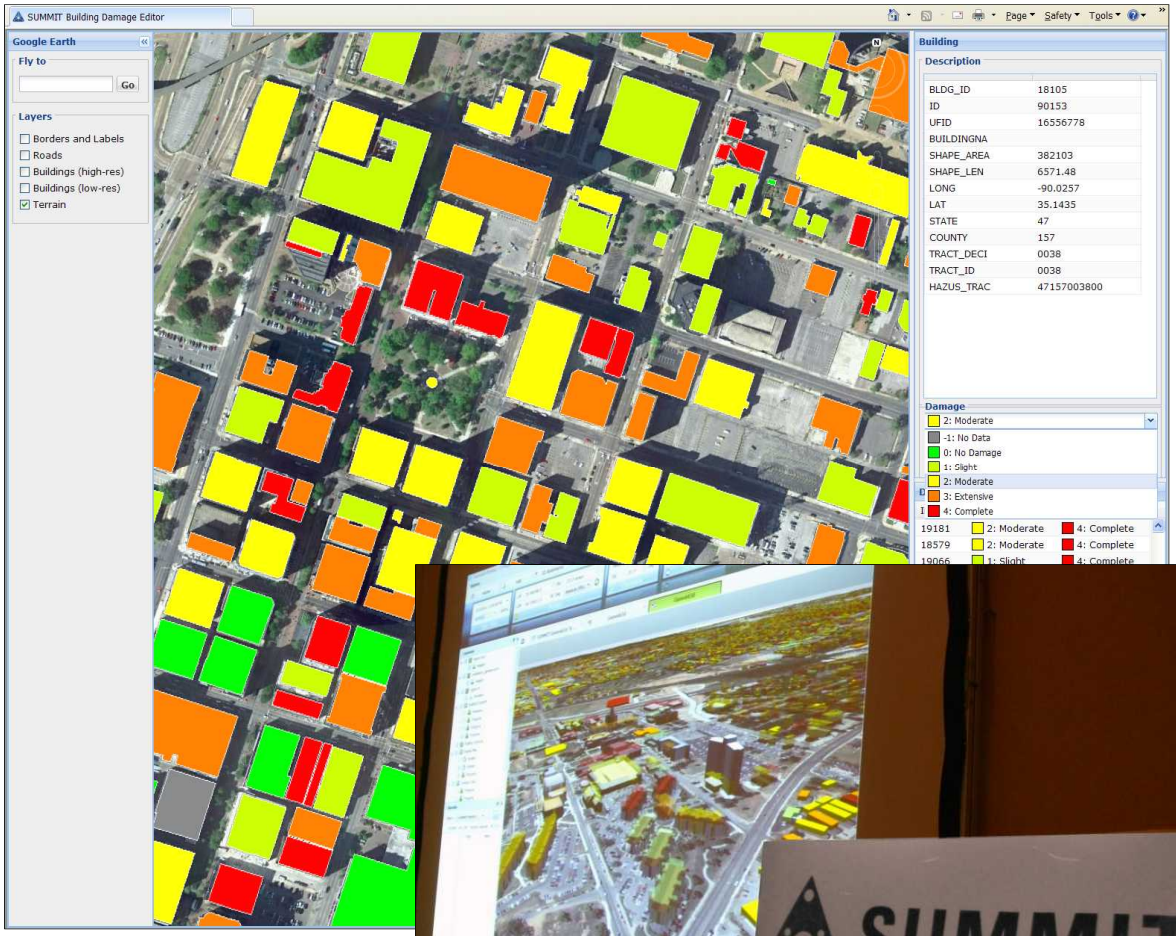
SUMMIT's Scenario Adjudication Tool allowed state and local planners to refine scenario

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

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

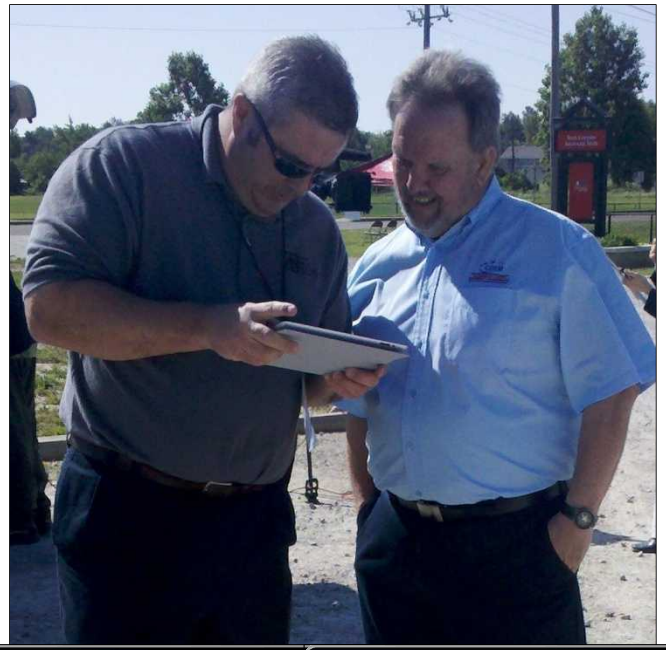
Tool was piloted in locations with shaking severity (MMI) > VI and populations > 25,000.

Adjudicated data became part of ground truth (used in Master Control Cell), and tool became a building damage viewer.



SUMMIT Portable Visualization (iPad) Pilot allowed players to view virtual building damage in the field

SUMMIT generated individual building damage states, based on HAZUS results. Building damage was adjudicated with exercise planners. **Building damage data was visualized in 3D environment** and viewed on a portable device (iPad).



Images of scenario building damage were piloted with 'boots on the ground' players to explore their use for building damage assessments. This virtual view of damage in the field provides **enhanced realism** to exercise scenario.

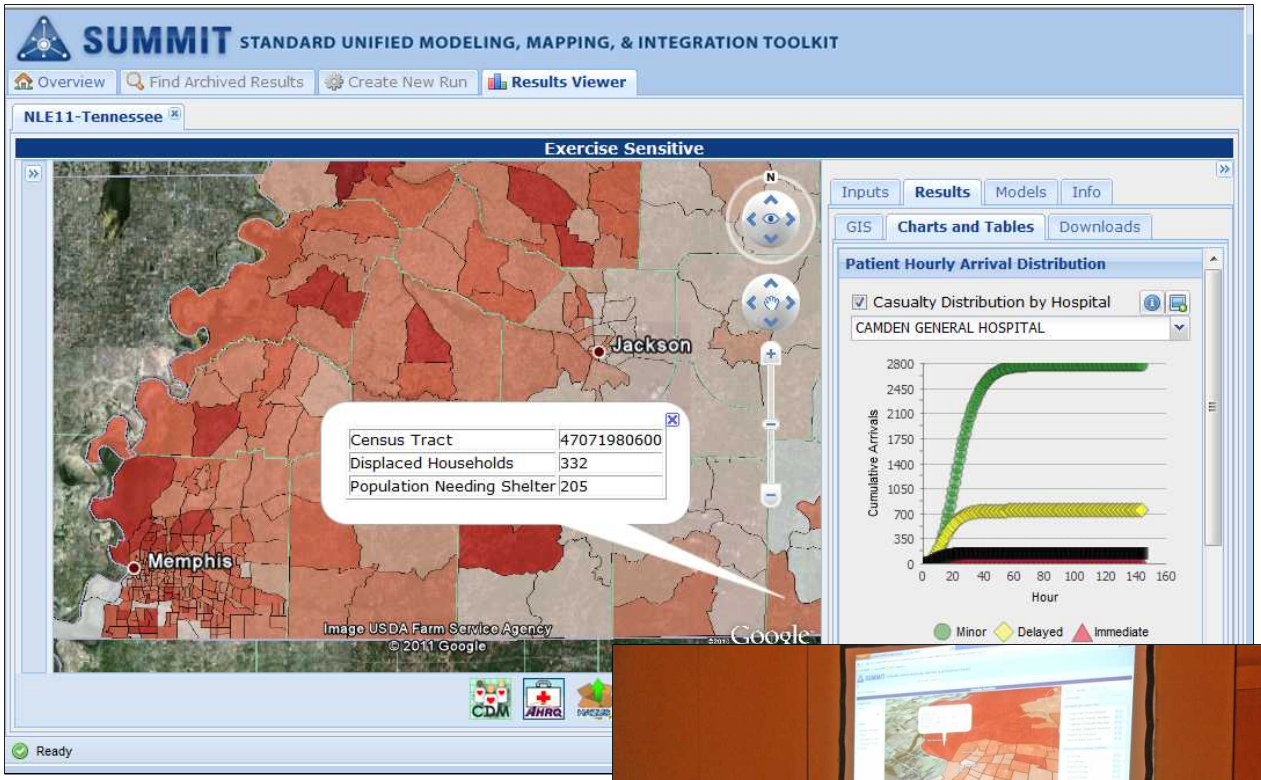
iPad visualization was piloted in Jonesboro, AR.

SUMMIT PROVIDED A BROWSER-BASED NLE 11 RESULTS VIEWER FOR TRUSTED AGENTS AND MCC

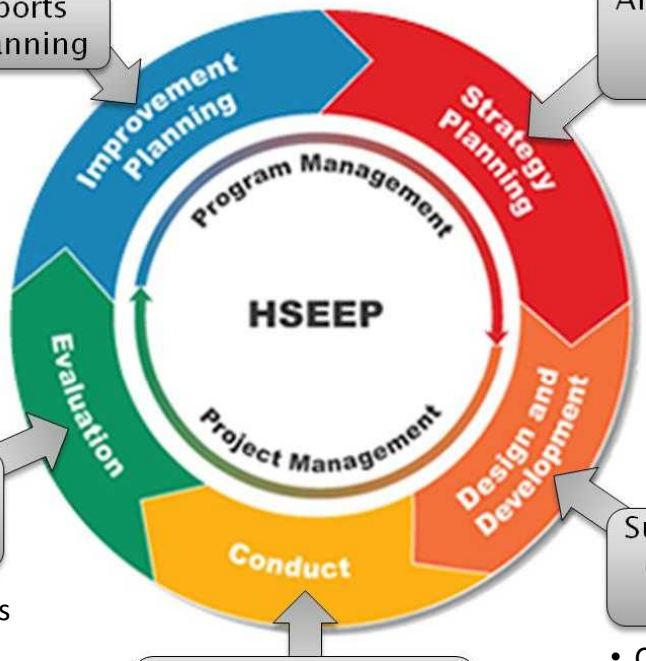
Upon request, trusted agents were given access to SUMMIT results viewer with NLE 11 scenario data prior to and during exercise

NLE 11 trusted agents were verified by NLE 11 scenario planning team. CDC, USTRANSCOM, NLE 11 planning team participated

NLE 11 results viewer was also used in the Master Control Cell for common operating picture



BEYOND NLE: M&S IN NATIONAL EXERCISE DOCTRINE



M&S reuse supports improvement planning

- Can reuse and replay previously developed exercise scenarios
- Can develop and reuse standardized exercises to assess readiness

Allows for utilization of Modeling & Simulation

- Can search for and use models that support the exercise being planned
- Can support both discussion- and operations-based exercises

Archived M&S results allow for play review and analysis.

- Can evaluate player actions with analysis data
  - e.g., "by taking this action, the Incident Commander helped reduce the fatality rate significantly"
- Can replay exercise events

Supports development of scenario, ground truth and MSEL

- Can apply science-based analysis
  - e.g., by changing location of attack, a critical asset is affected which supports exercising objective 1
- Can create quantitative injects
  - e.g., "for NLE10 scenario, X number of hospital surge beds, Y number of ventilators required."

Execute models in real-time to provide on-demand injects

- Can alter ground truth during exercise, as needed
- Can provide data visualization to enhance situational awareness

LOOKING AHEAD

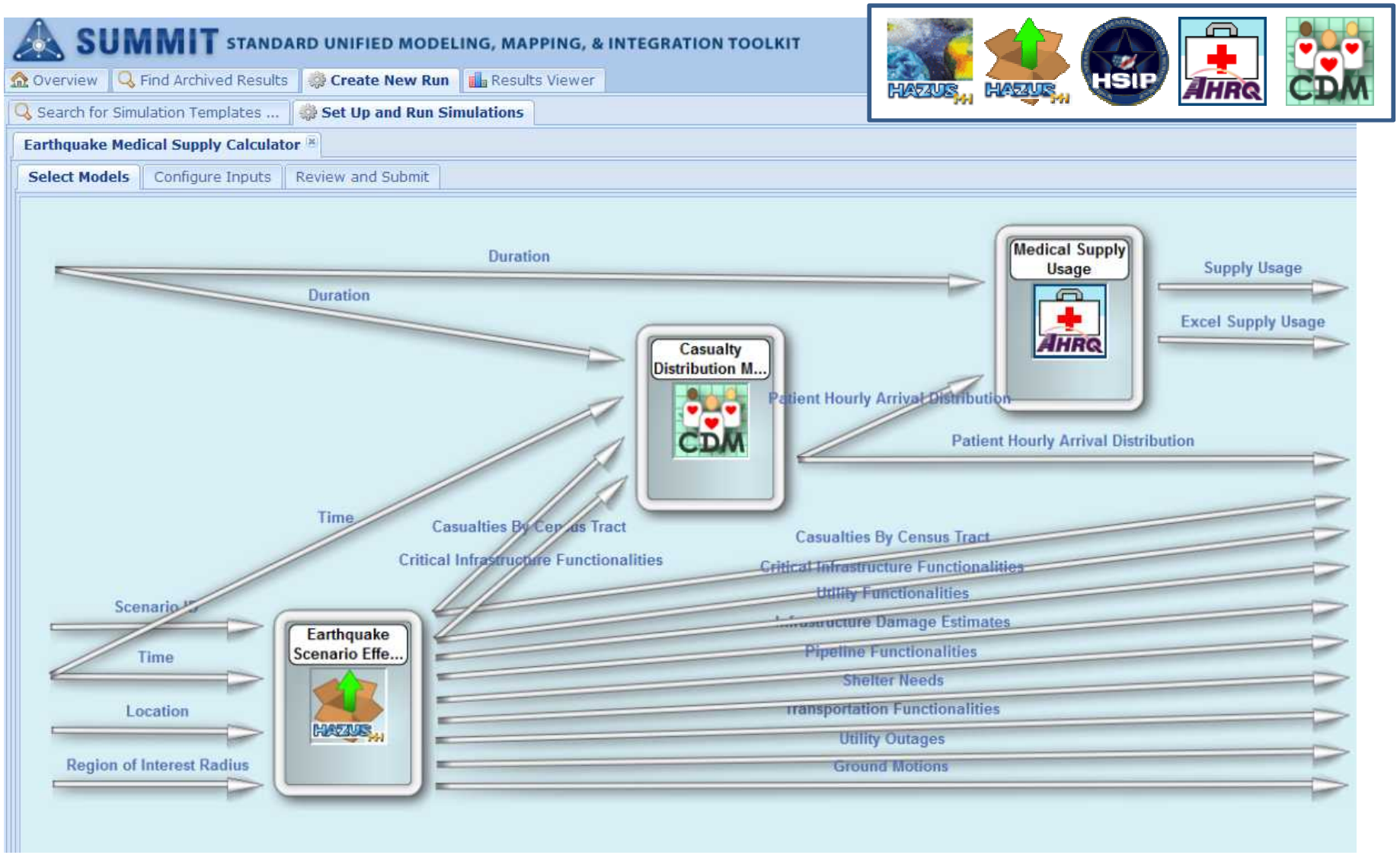
- Transition of SUMMIT to FEMA National Exercise Division (NED)/ National Exercise and Simulation Center (NESC)

- Pull for M&S/SUMMIT to support response

Jalal Mapar (DHS S&T) and Keith Holtermann (FEMA NED Director) discussing SUMMIT with Richard Serino (FEMA Deputy Administrator)

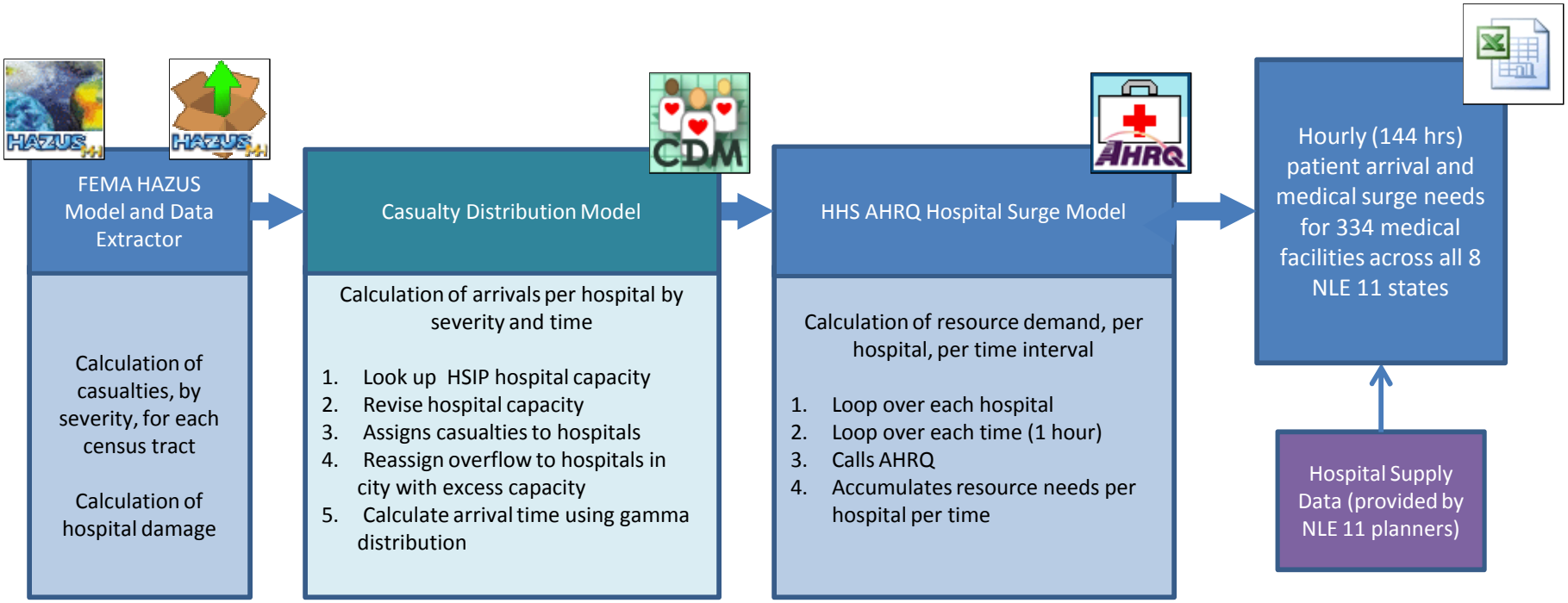
QUESTIONS

SUMMIT NLE 11 TEMPLATE



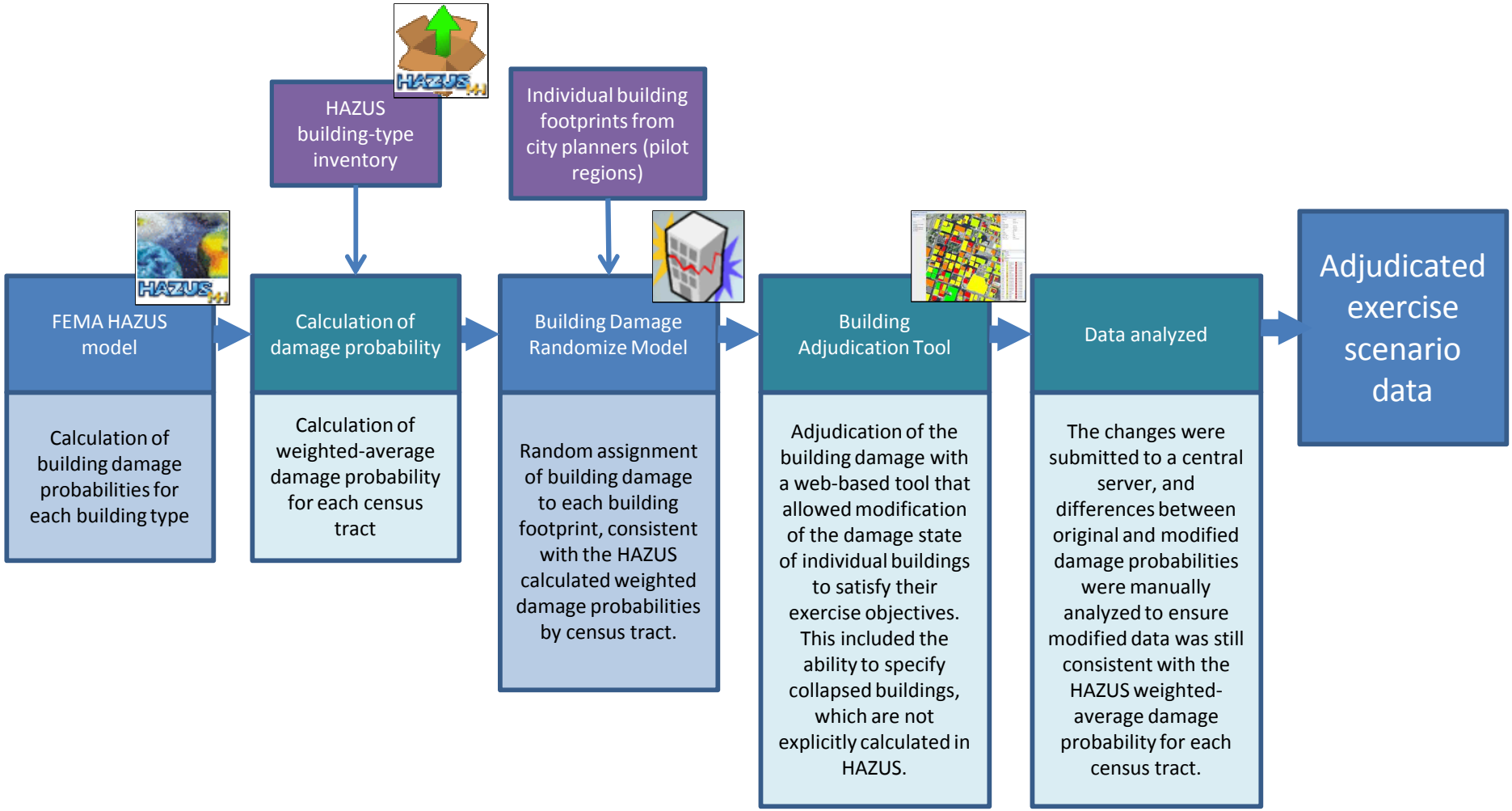
SUMMIT Casualty/Medical Surge Dataflow

NLE 11 Scenario



SUMMIT Building Damage Dataflow

NLE 11 Scenario



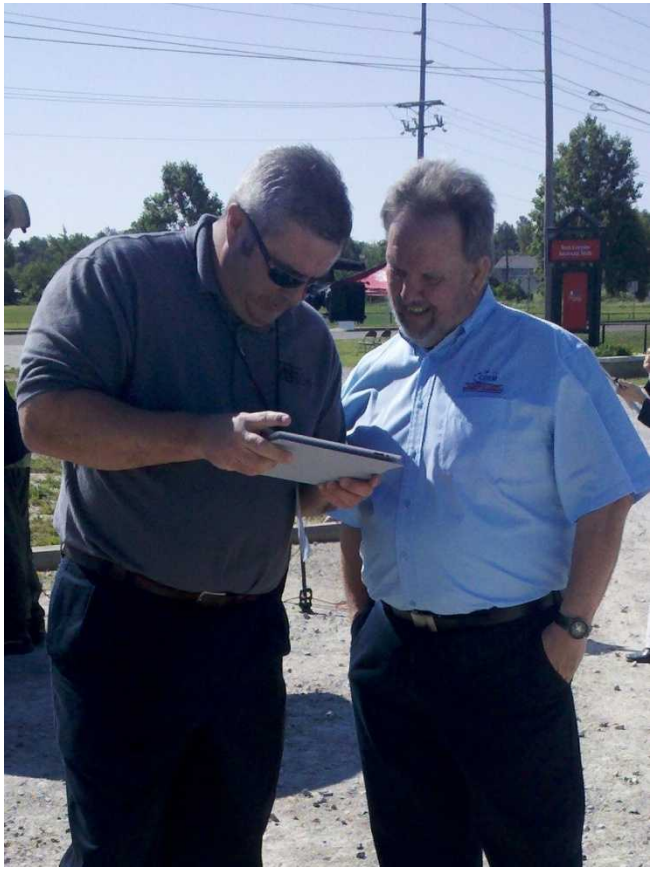
MASTER CONTROL CELL

SUMMIT Team showing building collapse data to ESF 9 (Urban Search & Rescue)

Jalal Mapar (DHS S&T) and Keith Holtermann (FEMA NED Director) discussing SUMMIT with Richard Serino (FEMA Deputy Administrator)

JONESBORO, ARKANSAS

Discussing the iPad capability with National Guard members



Demonstrating iPad capability with David Moore (Craighead County emergency management director)

David Moore (Craighead County emergency management director) using iPad visualization capability