

SUMMIT EPANet Capabilities

10/4/2012

Nerayo Teclemariam

Sandia National Laboratories

SUMMIT Team



FEMA



SUMMIT



**Homeland
Security**

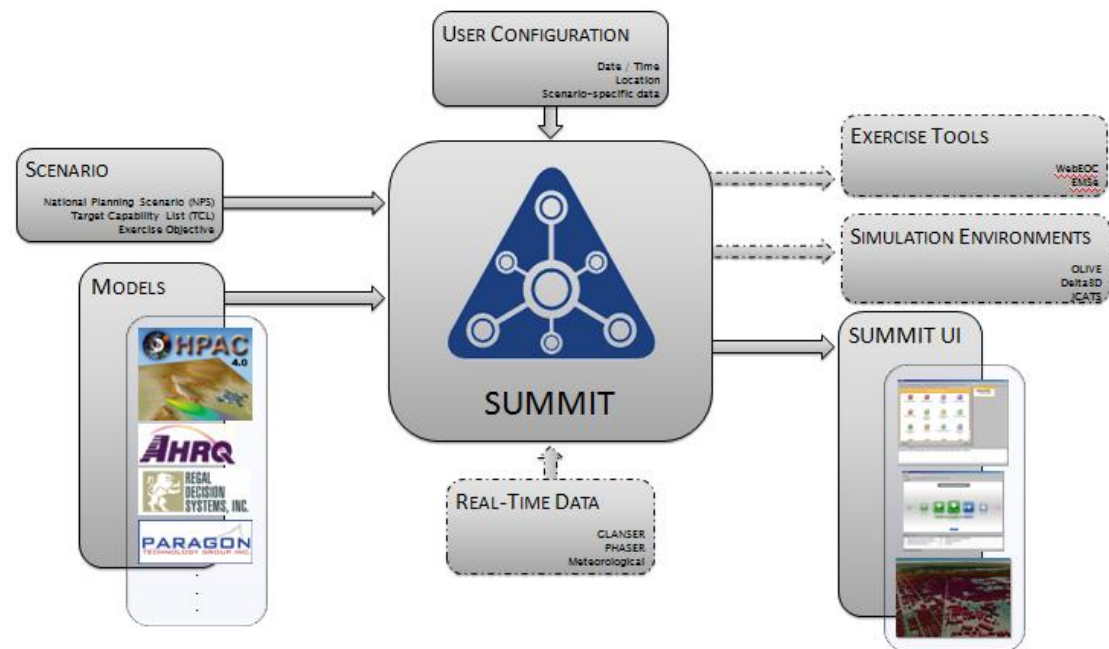
Science and Technology

What is SUMMIT?

A Geo-Agile Platform that enables users to

1. discover and reuse models,
2. integrate them quickly and economically, and
3. apply them in analyses

to improve the planning and execution of large and small exercises, planning efforts, and eventually response operations.



EPANet capability for FEMA Exercise

In support of a FEMA exercise the SUMMIT team “wrapped” EPANet to provide data for exercise planners, controllers, and players

Specifically, the SUMMIT capability enabled:

- GUI modification of EPANet network properties
- Command line driven (and batch) running of EPANet
- EPANet results linked to economic impacts estimates and critical infrastructure data
- Display of EPANet data in ESRI ArcGIS and Google Earth KML formats



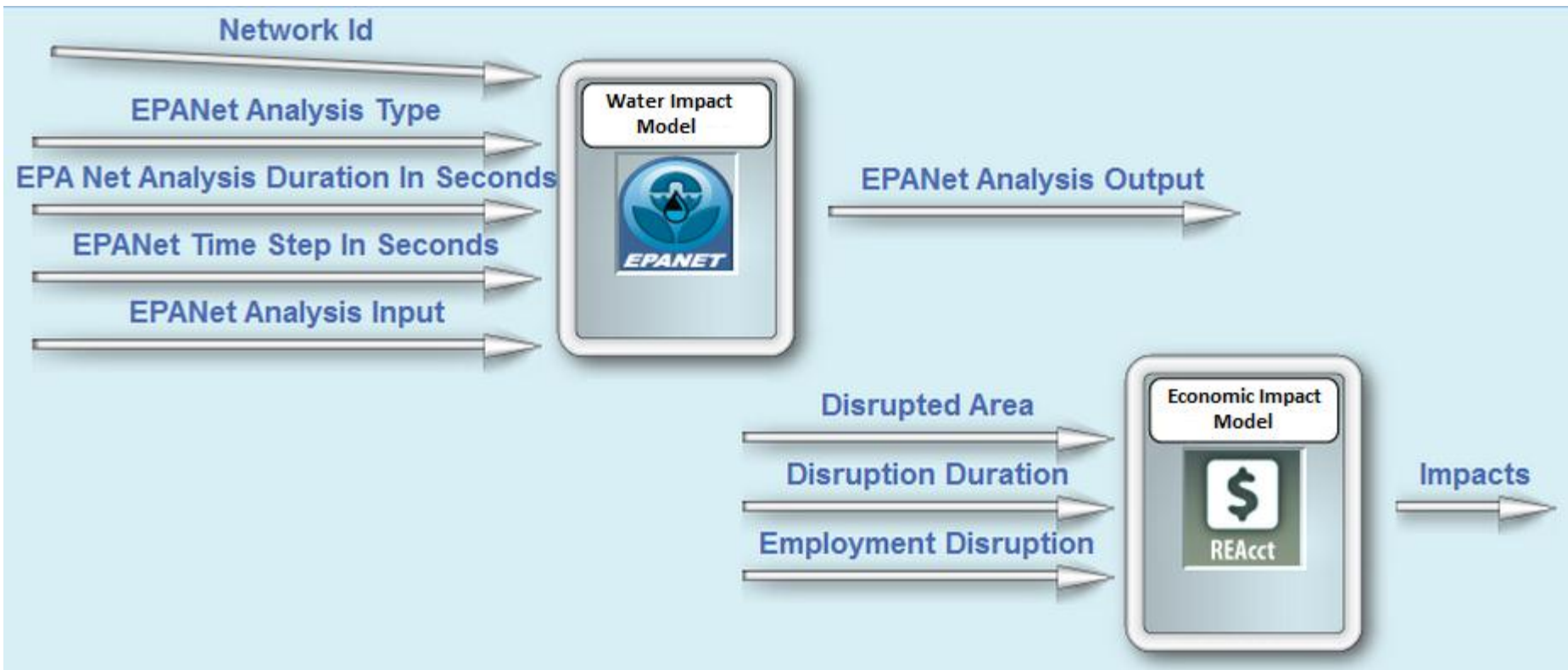
Homeland
Security

Science and Technology



Configuring SUMMIT Template

SUMMIT configures and processes runs using templates, which is an abstract representation of an incident to be simulated. It provides a pattern or workflow for linking together and rendering interoperable models and data to address that incident.

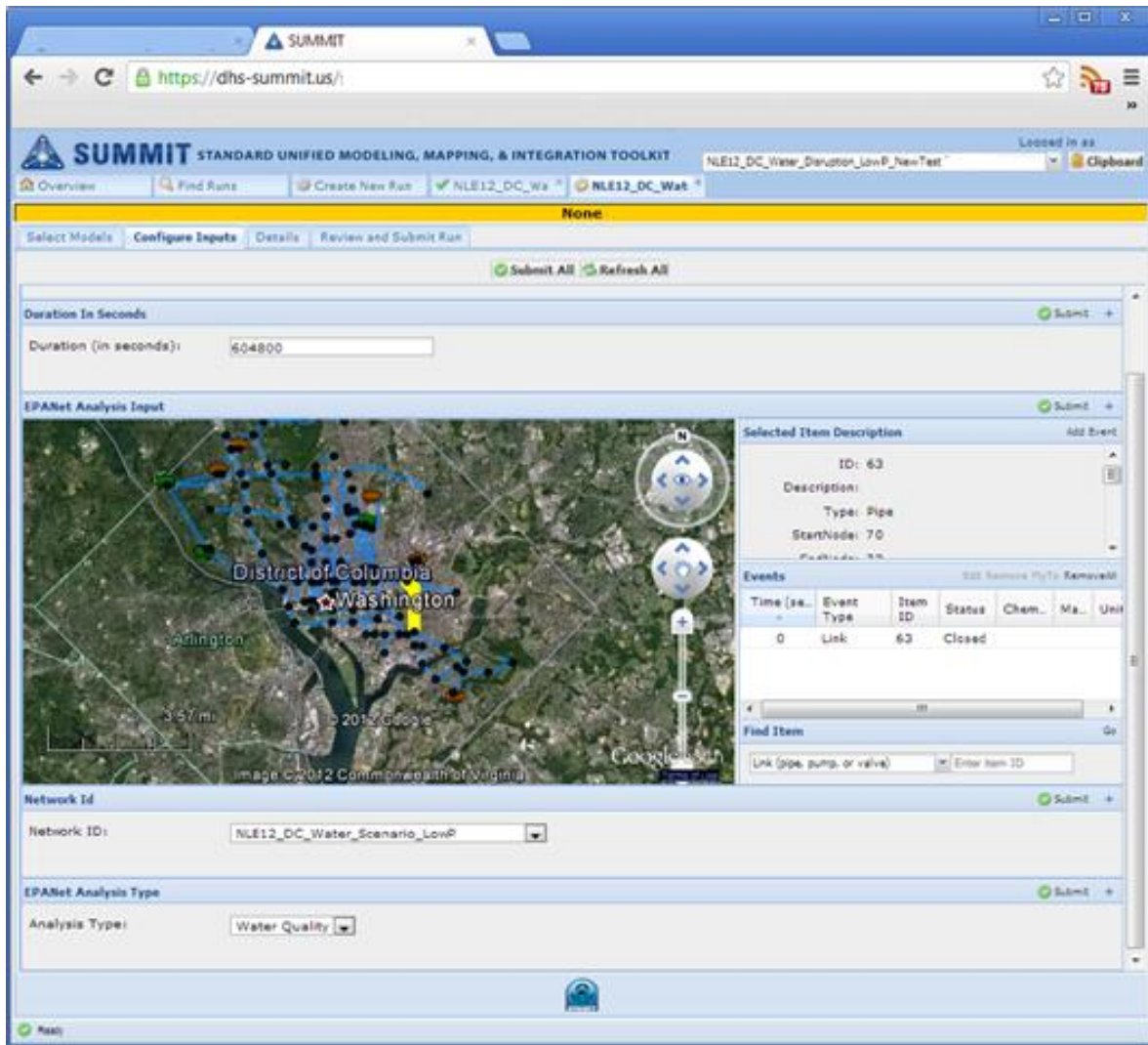


Configuring Model Inputs in SUMMIT GUI

List of EPANet parameters users can currently alter in SUMMIT*

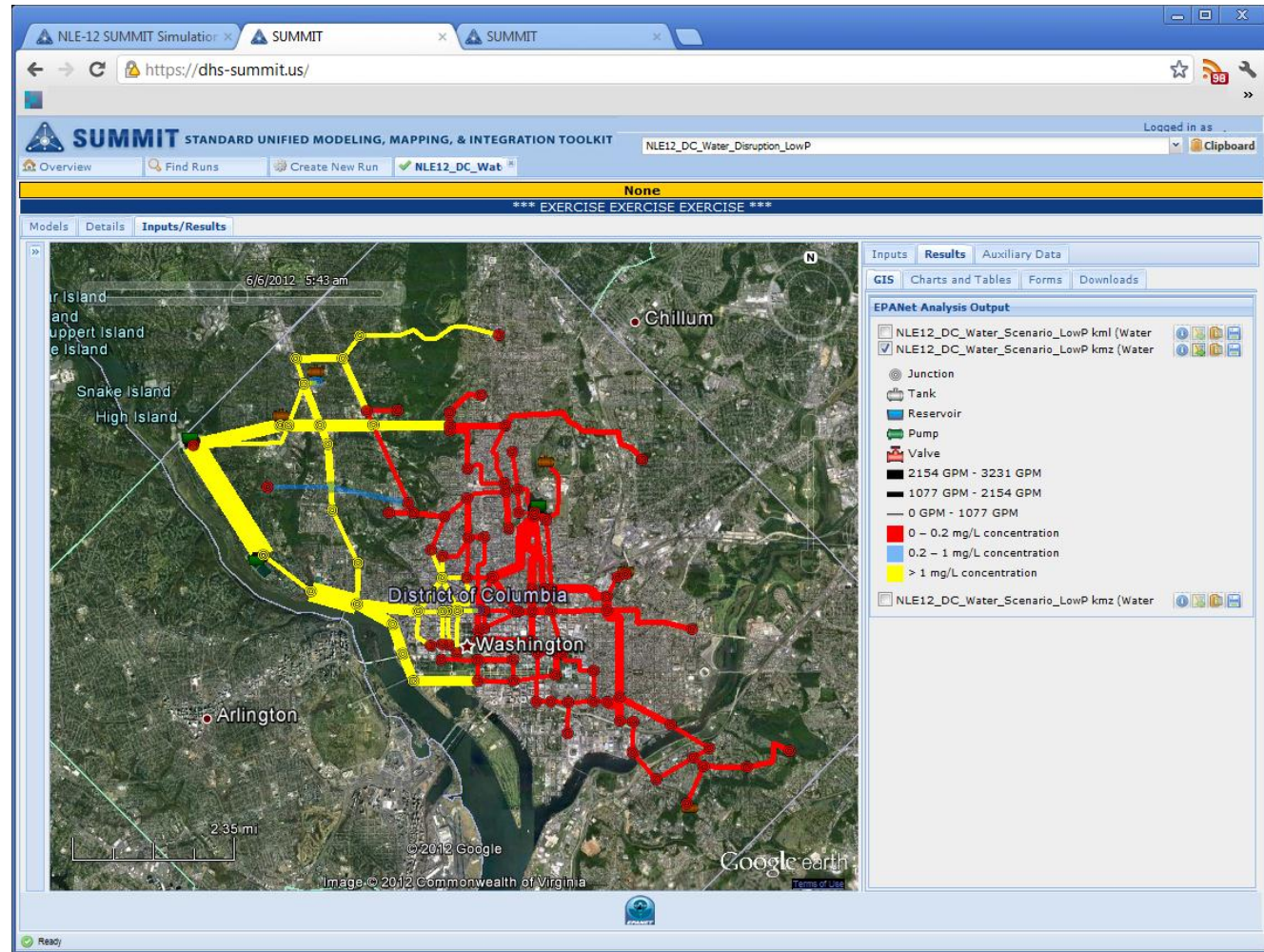
1. Analysis Type (Quality or Hydraulic)
2. Duration of analysis
3. Time analysis step
4. Open/close values at specific time step

* Additional parameters can be added to SUMMIT



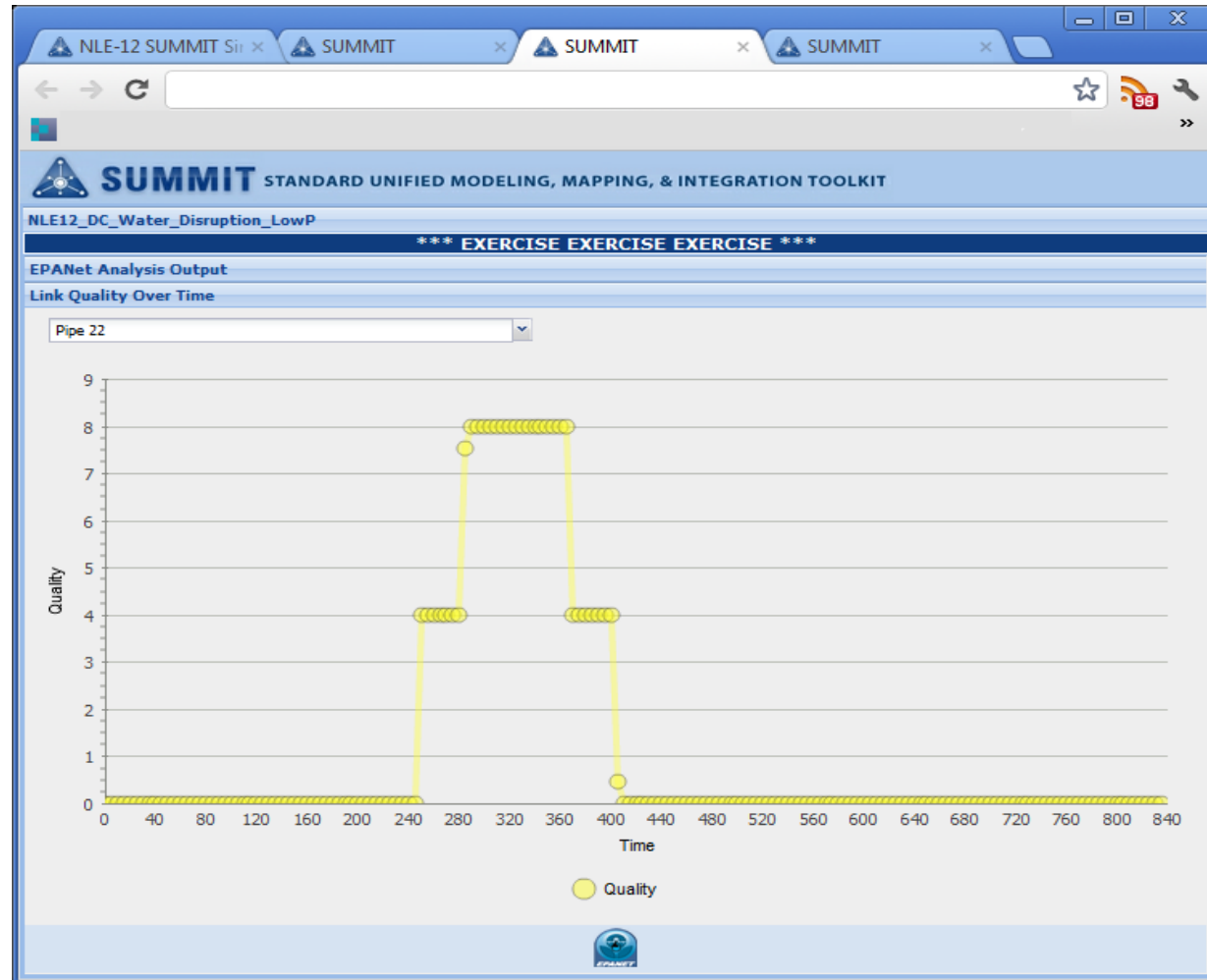
EPANet Water Quality Product in SUMMIT

SUMMIT configured EPANet to initiate an contamination inject and display water quality exceeding acceptable limits over time via Google Earth slider bar



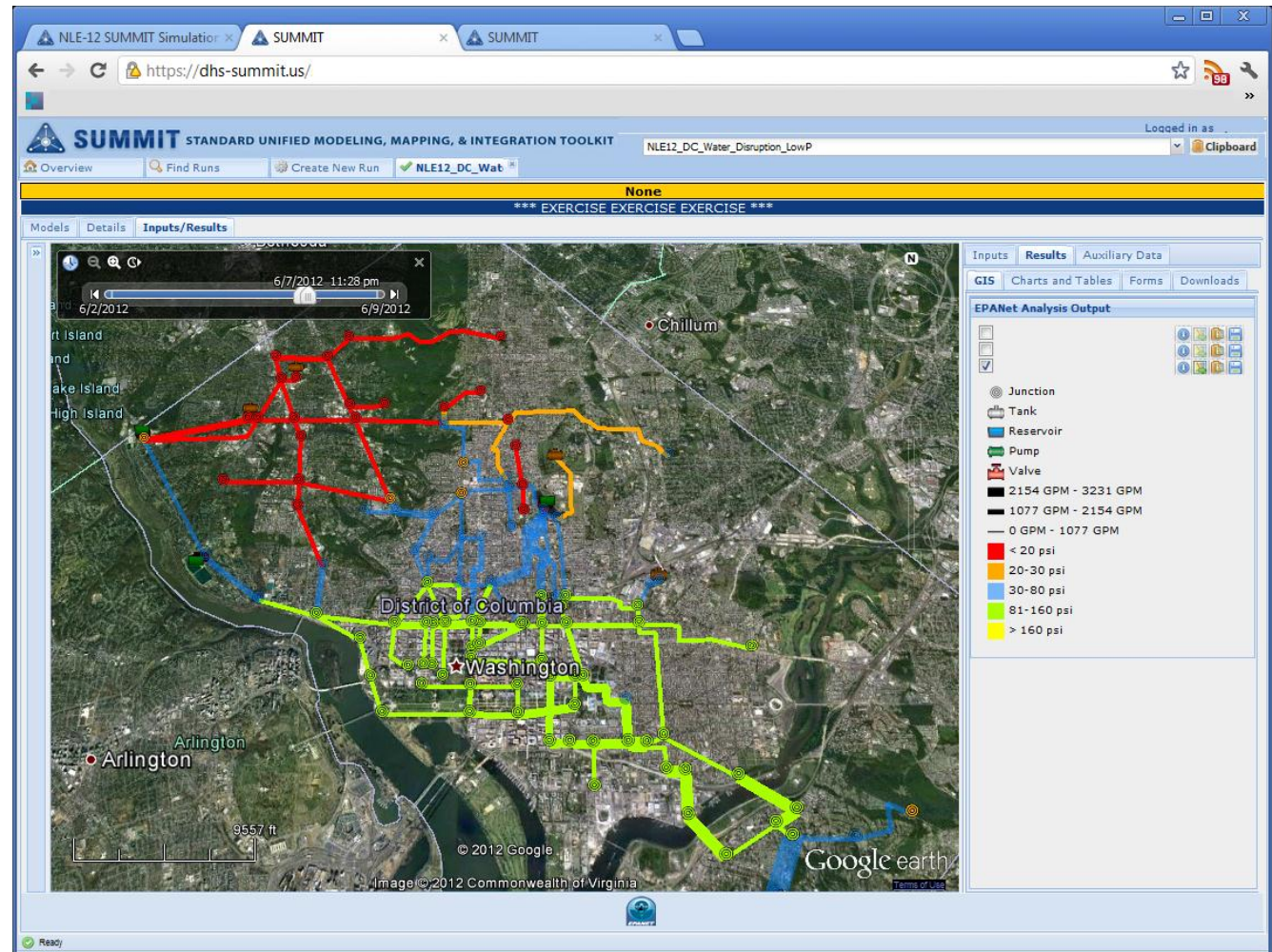
EPANet Quality Data Displayed as Charts

SUMMIT's flexible data types allow model products to be efficiently displayed in multiple formats include charts and tables.



EPANet Pressure Results in SUMMIT

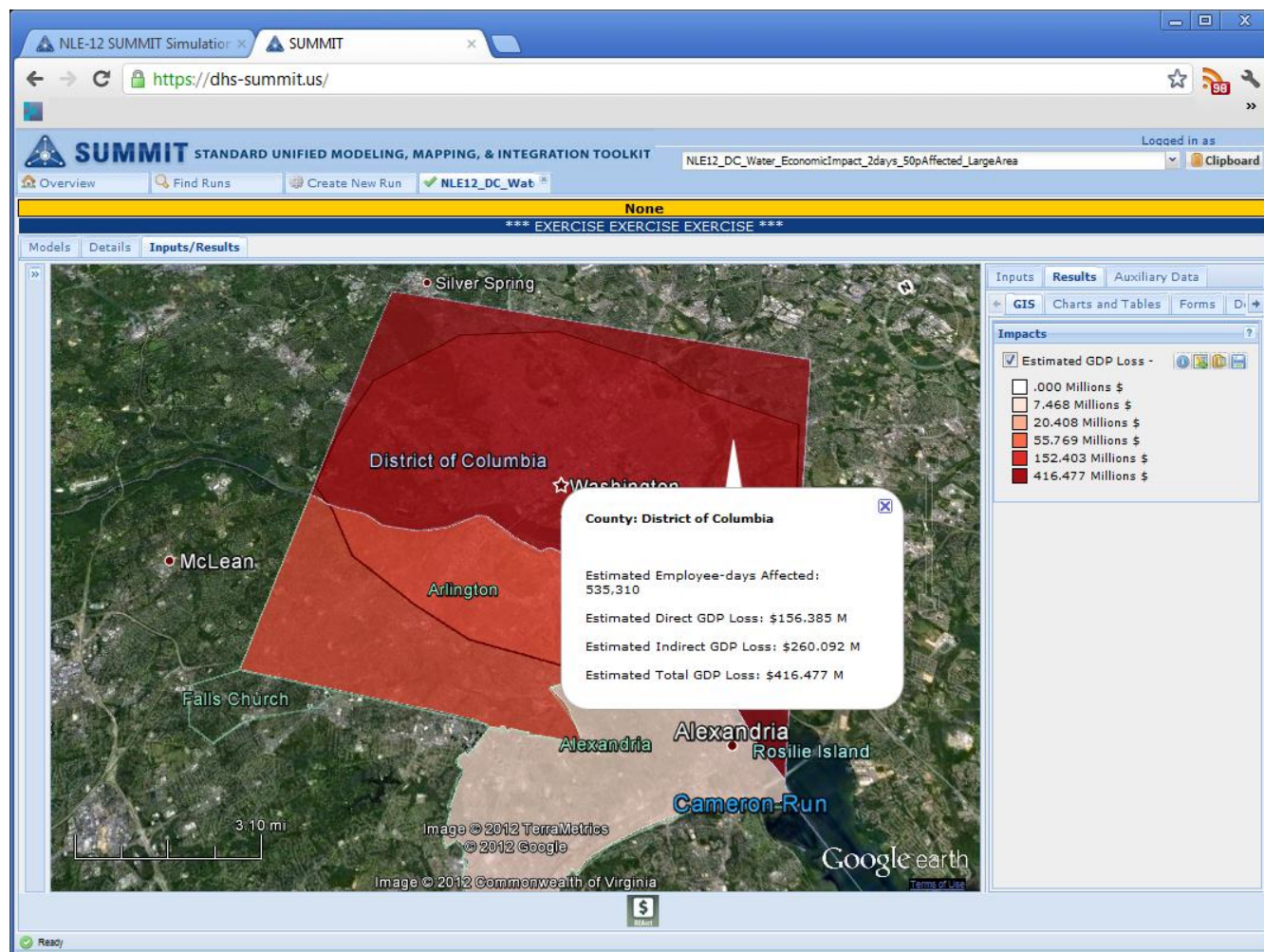
SUMMIT configured EPANet to initiate an abrupt pipe closure and display pressures exceeding acceptable limits over time via Google Earth slider bar.



Linking to Economic Impacts

To model the potential economic effects of city-wide water disruptions, the Regional Economic Accounting (REAcct) analysis tool has been used within SUMMIT.

REAcct is modeling a representation of the worst case scenario for the estimated Gross Domestic Product losses when everything else is held constant. REAcct also calculates the part-time and full-time affected employees.



EPANet Water Quality Displayed on Mobile Client with Critical Infrastructure

FASTMap is a web and mobile/tablet based application that dynamically displays U.S. national infrastructure on a map. FASTMap can show any disruption area such as a flood, hurricane, or earthquake, and rapidly produce a publication quality map as well as a report on the assets at risk.

FASTMap has been used to overlay SUMMIT modeling results with the NGA's (National Geospatial Intelligence Agency) national infrastructure database Homeland Security Infrastructure Program (HSIP) Gold to provide an integrated view of infrastructure affected by the scenario elements, via an iPad app.



Current SUMMIT Models Available (mapped to National Planning Scenarios) for Potential linkage with EPANet

	NPS 1	NPS 2	NPS 3	NPS 4	NPS 5	NPS 6	NPS 7	NPS 8	NPS 9	NPS 10	NPS 11	NPS 12	NPS 13	NPS 14	NPS 15	I.D.	Flood	
THREAT MODELS																		
Air Dispersion (Plume)																		
HPAC								M										
Sweden Plume Model																		
Disease																		
SIR Disease Model																		
CONSEQUENCE MODELS																		
Medical Needs																		
AHRQ Hospital Surge Model																		
Hospital Bed Capacity Model																		
BERM Clinic Staffing Model																		
Transportation																		
(RAIL) - RNAS																		
Population Movement																		
Air Travel Population Movement Model																		
Regional Travel Model																		
Infrastructure Effects																		
Building Damage Randomization Model																		
HAZUS Data Extractor (**Extraction ONLY)																		
Sweden Infrastructure Effects Model																		
Flood critical infrastructure effects model																		
HSIP Infrastructure effects model																		
GIS Utility Slot Model																		
Casualties																		
HPAC																		
HAZUS Data Extractor (**Extraction ONLY)																		
AEGL Health Effects Models																		
GIS Utility Slot Model																		
Water Networks																		
EPANet																		
Flood																		
Flood Inundation Model																		
Flood Population Effects Model																		
Economic Effects																		
ReAcct																		M
2012 - 08																		

SAND 2012-7606 P



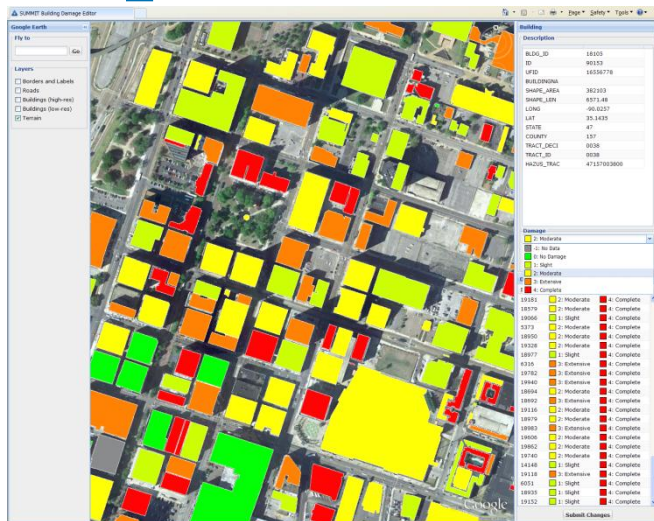
Homeland Security

Science and Technology

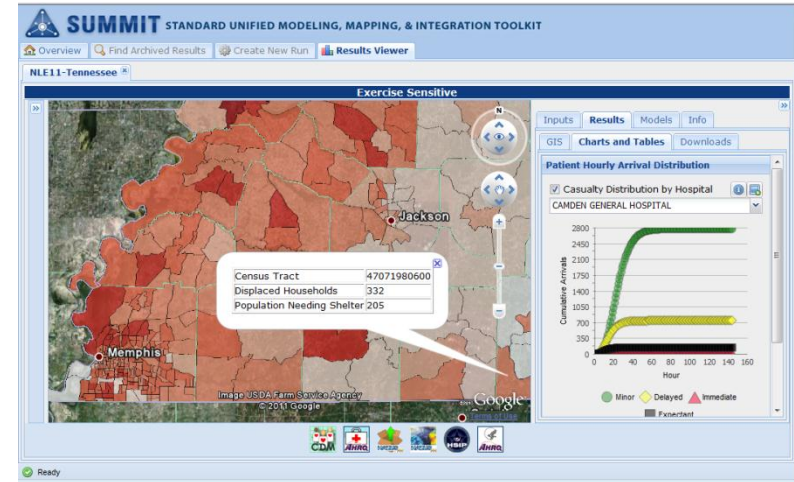


FEMA

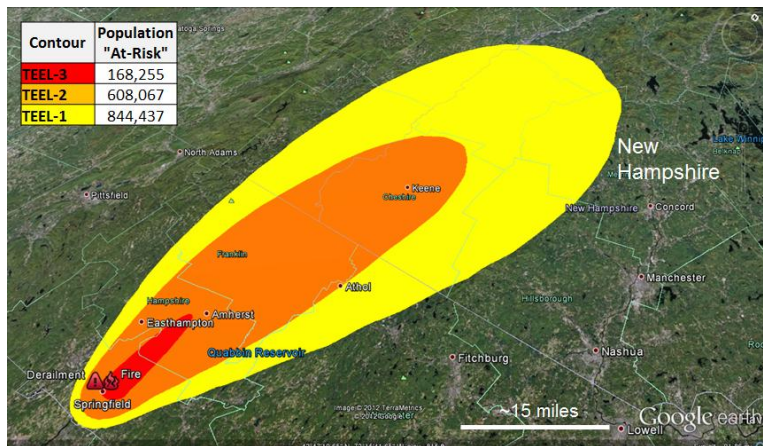
Sample of SUMMIT Products



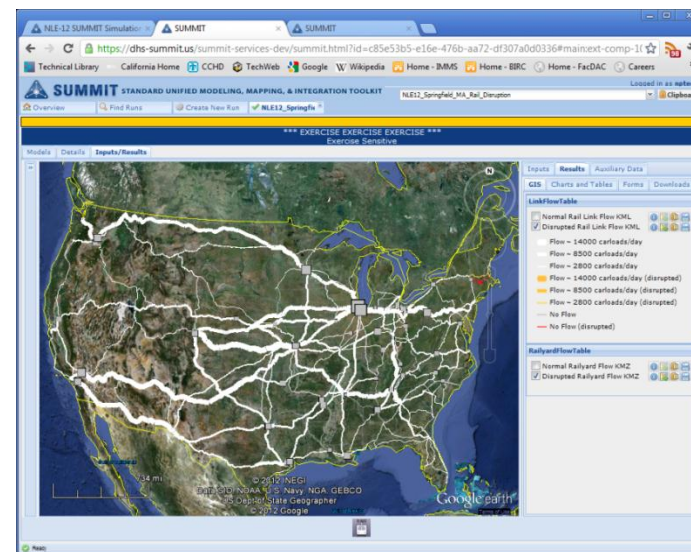
Earthquake impacts



Hospital surge requirements

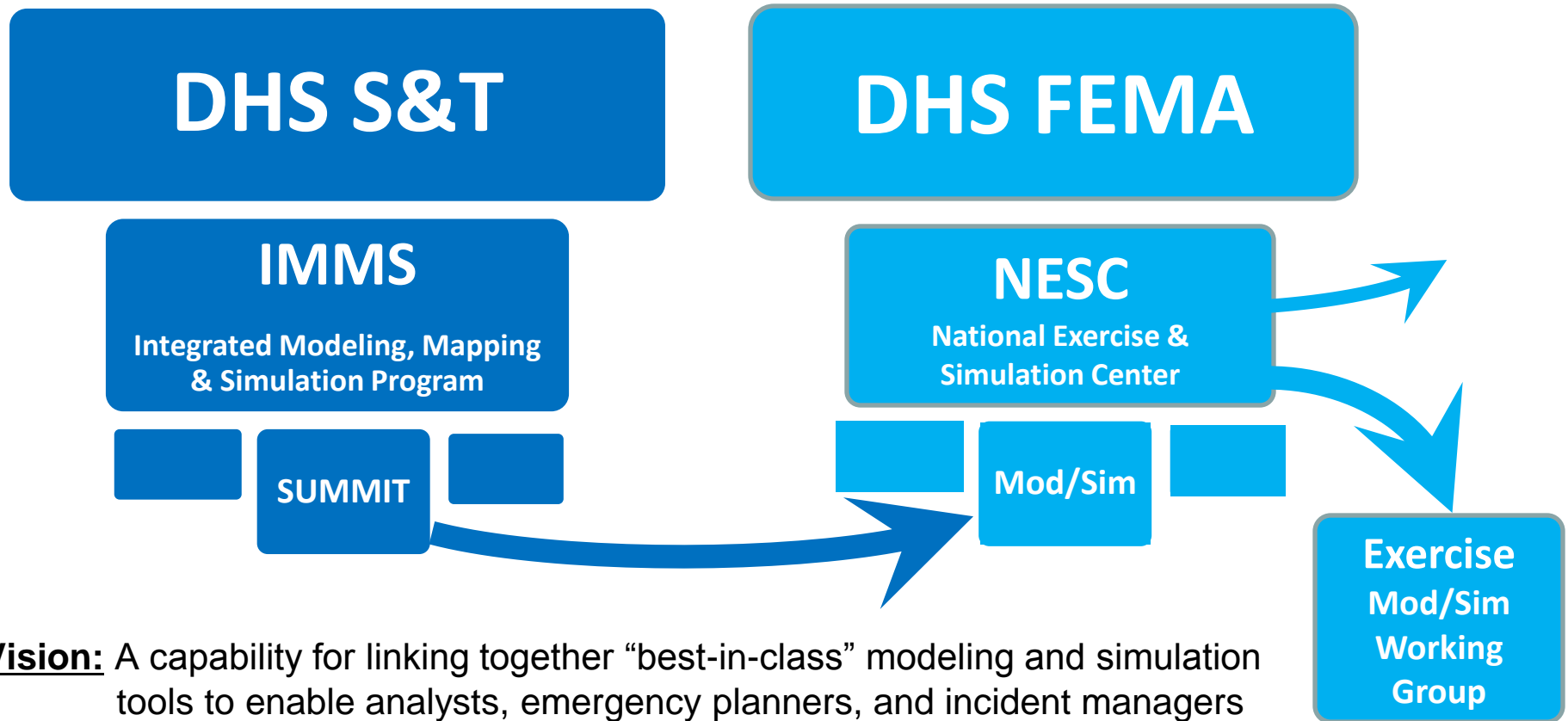


Chemical, biological, radiological plumes



Freight rail impacts

Standard Unified Modeling, Mapping, and Integration Toolkit (SUMMIT) is transitioning to FEMA



Vision: A capability for linking together “best-in-class” modeling and simulation tools to enable analysts, emergency planners, and incident managers more effectively, economically, and rapidly prepare, analyze, train, and respond to real or potential incidents.

Key Modeling & Simulation Capabilities offered by SUMMIT

SUMMIT has provided several key capabilities on behalf of the NESC Helpdesk including:

- Ability to **ingest expected player actions in real-time** to rapidly generate new ground truth and modeling products
- Tapping best-of-class **response/analysis modeling resources** to assist players and planners “train as you fight” by using capabilities available during response
- Enhanced **cross platform common operating view** with iPad and web browser clients and multiple GIS formats for products.
- **Geoagility and rapid configurability** of models and templates allowed for rapid scenario scoping and inject creation

Contact Information

www.dhs-summit.us

National Exercise Simulation Center (NESC)

Justin Legary

DHS Federal Emergency Management Agency

National Exercise Division

Justin.Legary@fema.dhs.gov

SUMMIT Program Manager

Jalal Mapar

DHS Science & Technology

Infrastructure Protection/Disaster Management Division

Jalal.Mapar@dhs.gov

Sandia National Laboratories is the principal SUMMIT architect

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.



**Homeland
Security**

Science and Technology

