BAE SYSTEMS

Using Modeling and Simulation for Homeland Security Applications

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BAE SYSTEMS

- Modeling and Simulation at BAE Systems Armament Systems
- State of Real-Time Data Processing and Display Technologies
- Computer-Based Decision Aid Tools and Visualization Tools
- Potential Applications for Homeland Security
- Scenario Planning/Emergency Evacuation/Site Protection/Bio-Chem Neutralization
- Pathforward
- Q & A

Modeling and Simulation at BAE Systems Armament Systems

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- Physics Based Modeling
- Scenario Modeling and Simulation
- Interactive Modeling and Simulation
- Virtual Environment Generation
- Trainers and Trainings

Physics Based Modeling

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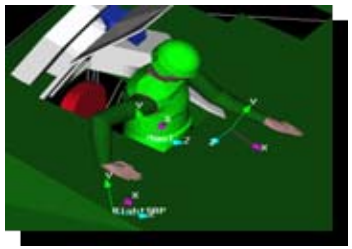
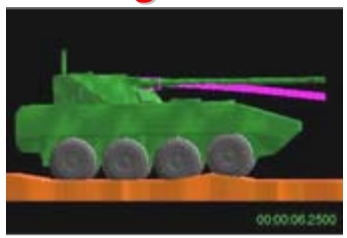
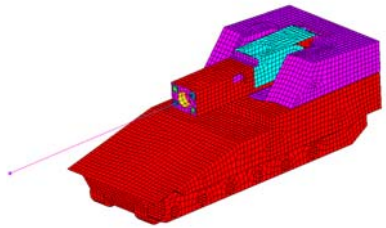
Human Factors Engineering
- SafeWork
- Jack

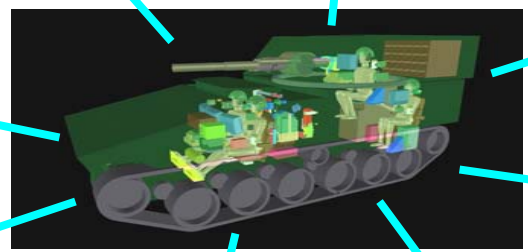


Dynamic Modeling
- DADS
- Virtual.Lab
- RecurDyn
- Recoil_V2



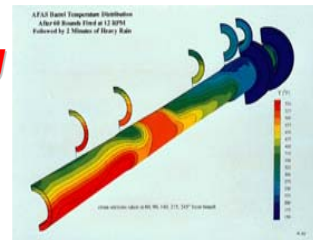


Finite Element Modeling
- NASTRAN
- ABAQUS



Pro-E Master Model

Thermal Modeling
- CFX
- WIND
- ANSYS
- VTT



"Real Time" Simulation & Visualization
- Division
- Coryphaeus
- VEGA / VEGAPrime

BRL - CAD

Pro-Manufacturing
- NC Tool Module
- Sheet Metal Module
- Mold Module
- CMM (Coordinate Measuring Module)

Survivability Analyses
- Signature Analyses
- Shot Line Analyses
- Compartment Level Vulnerabitliy

Scenario Modeling and Simulation

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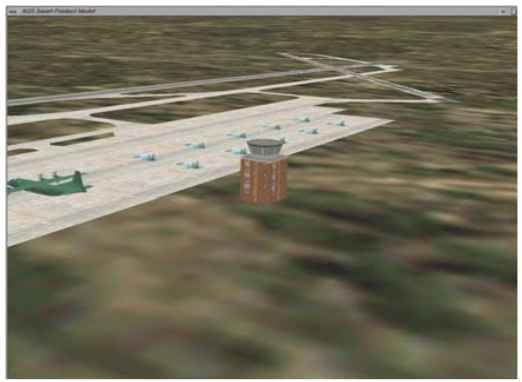

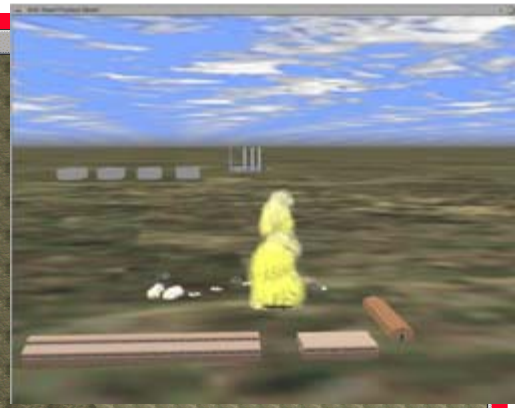

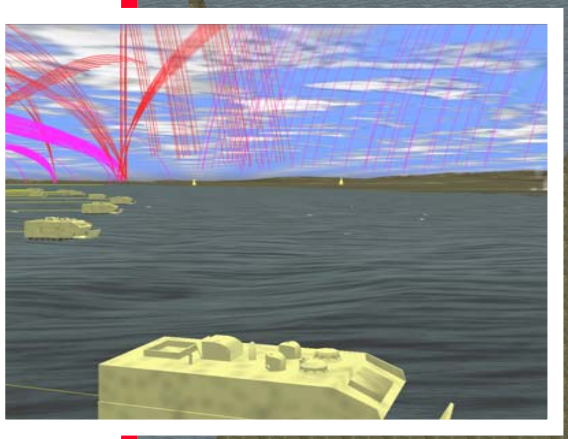

New Naval Ship

New Naval Ship

New Naval Ship

New Naval Ship

New Naval Ship

- DIS/HLA
- JSAF
- NSS
- ONESAF
- GVIS

Interactive Modeling and Simulation

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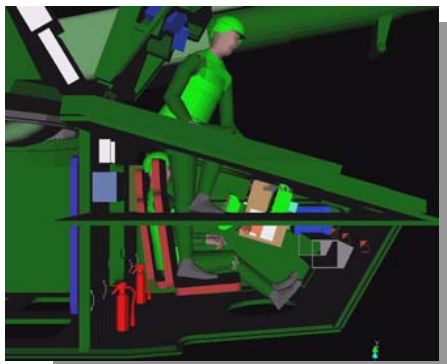
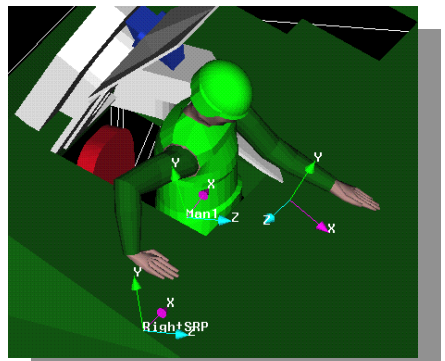
Real Person perform control functions in Virtual Environment





Virtual Environment Generation

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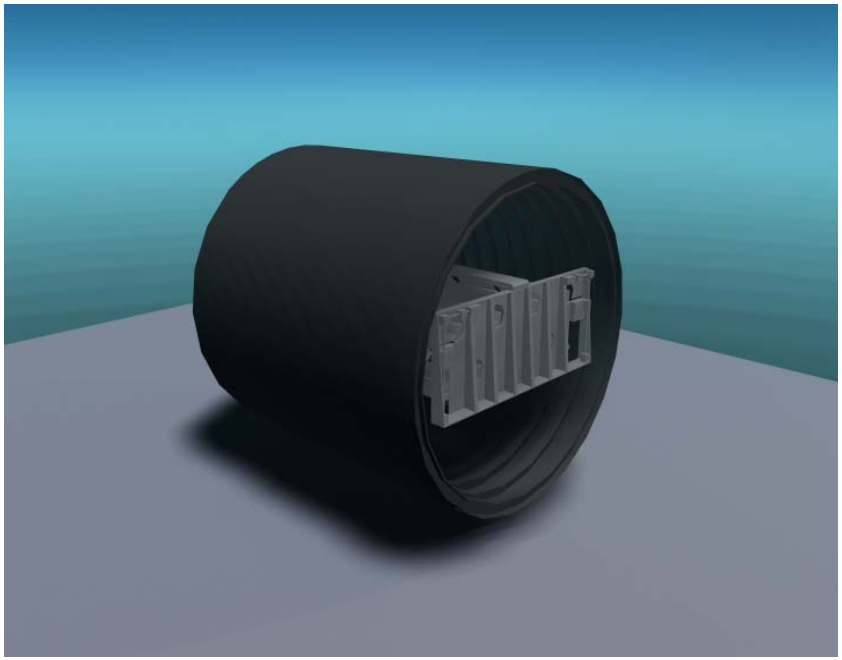

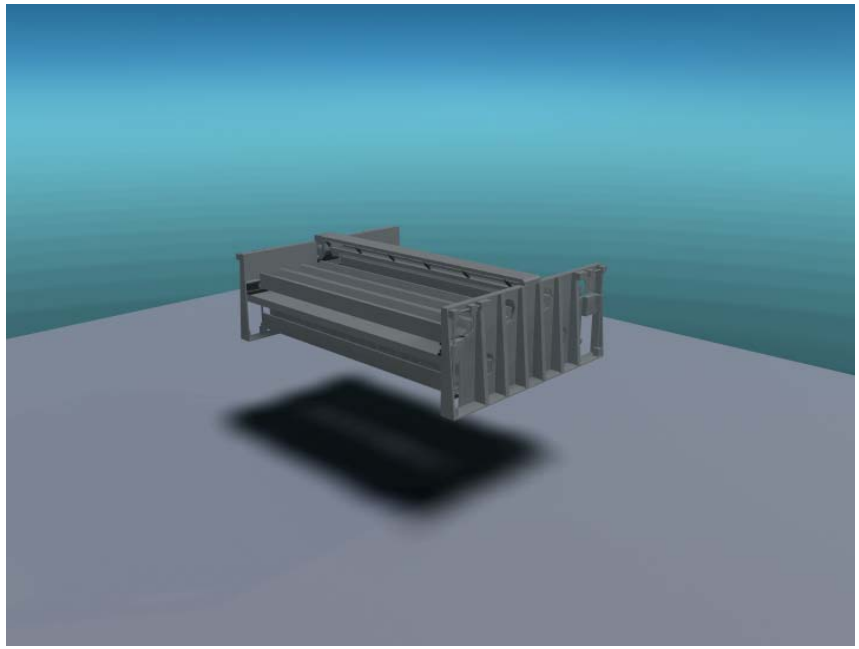

Trainers and Trainings

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State of Real-Time Data Processing and Display Technologies

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Computer-Based Decision Aid Tools and Visualization Tools

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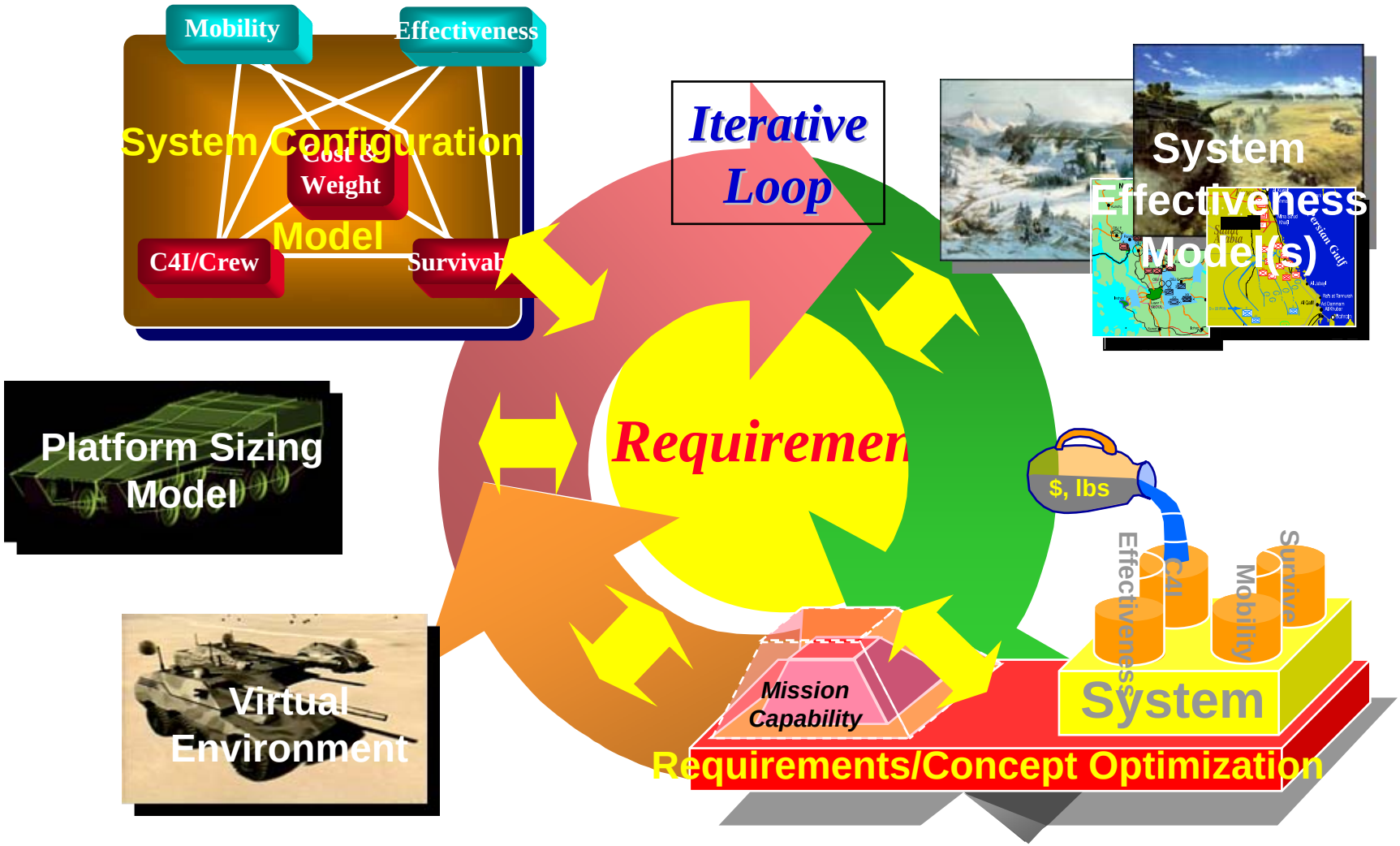

Visualization Tools and Environment

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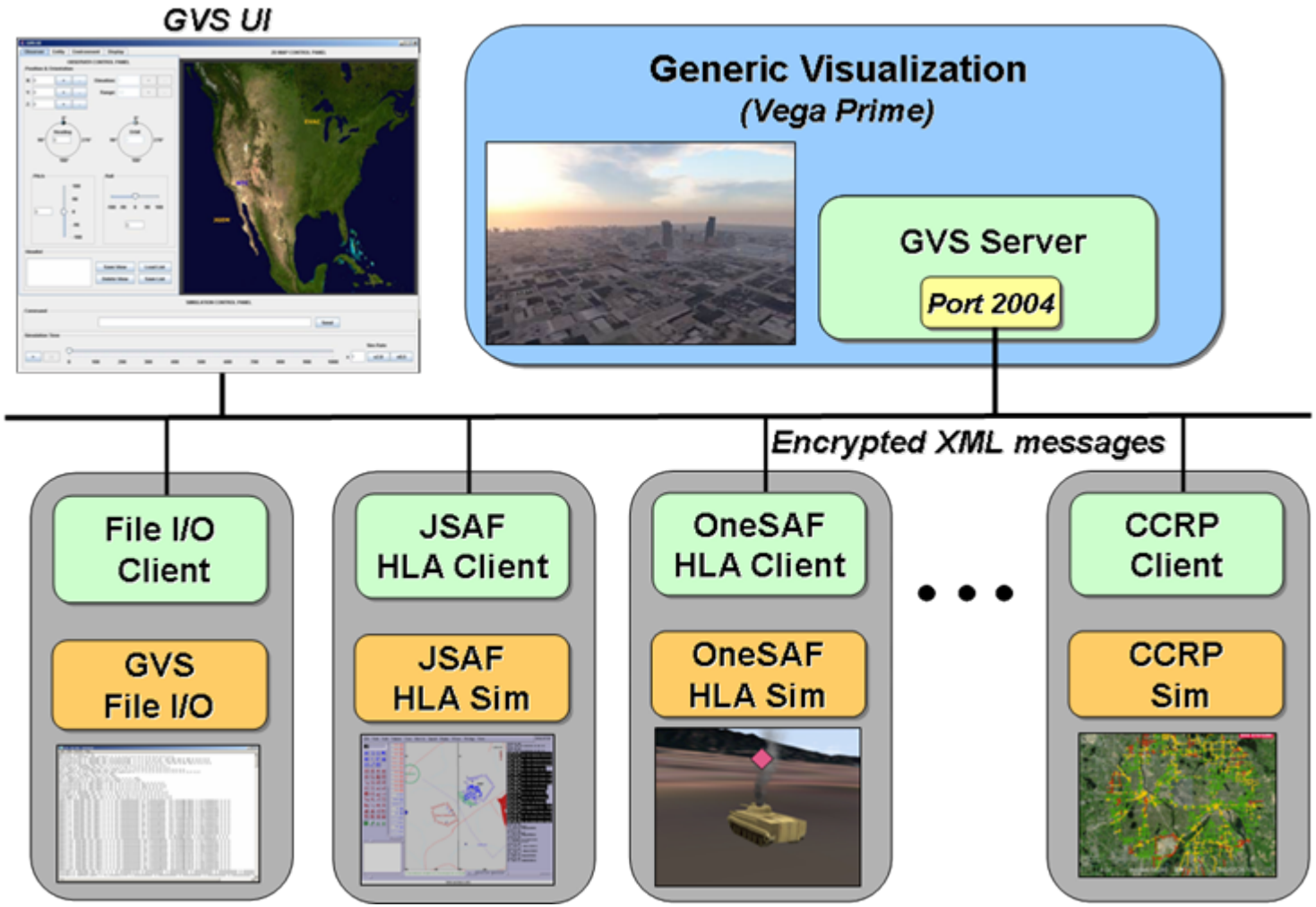
Generic Visualization System Architecture



Potential Applications for Homeland Security

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- Homeland Security Task Planning and “War Game”
- Training
- Mission Execution Exercises and Planning (including hybrid systems)
- After Action Review
- Hand Held Decision Aid
- Portable Control and Command Center
- Sensory Systems tracking and display
- Emergency Response Team tracking and control

Homeland Security Example Activities

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- Scenario Planning
- Emergency Evacuation
- Site Protection
- Bio-Chem Neutralization
- Human & Resource Tracking

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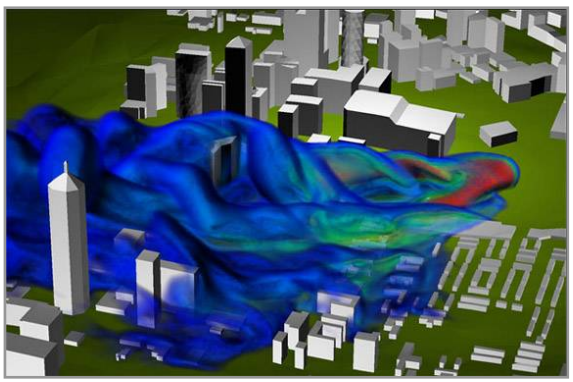
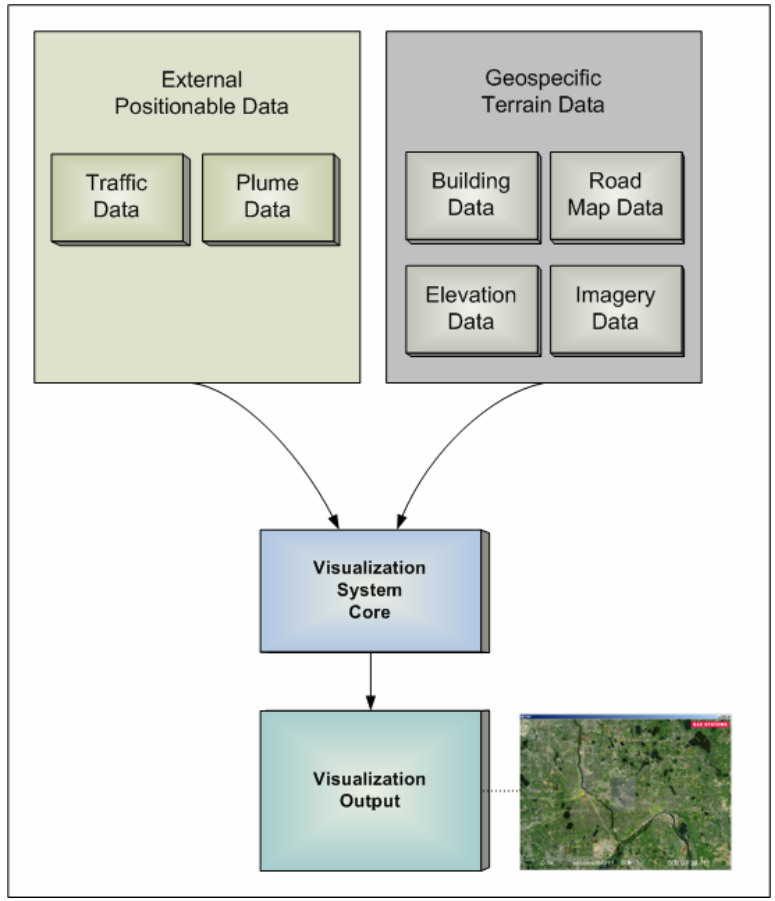
Evacuation Route Planning Scenario

- Playback of data from multiple simulations
  - Computational fluid dynamics modeling of contaminant cloud
  - Routing planner for optimizing evacuation routing
- Biochemical attack on an urban environment
  - Biochemical plume propagation through city
  - Population evacuates outside of a 1-mile evacuation radius





Emergency Evacuation

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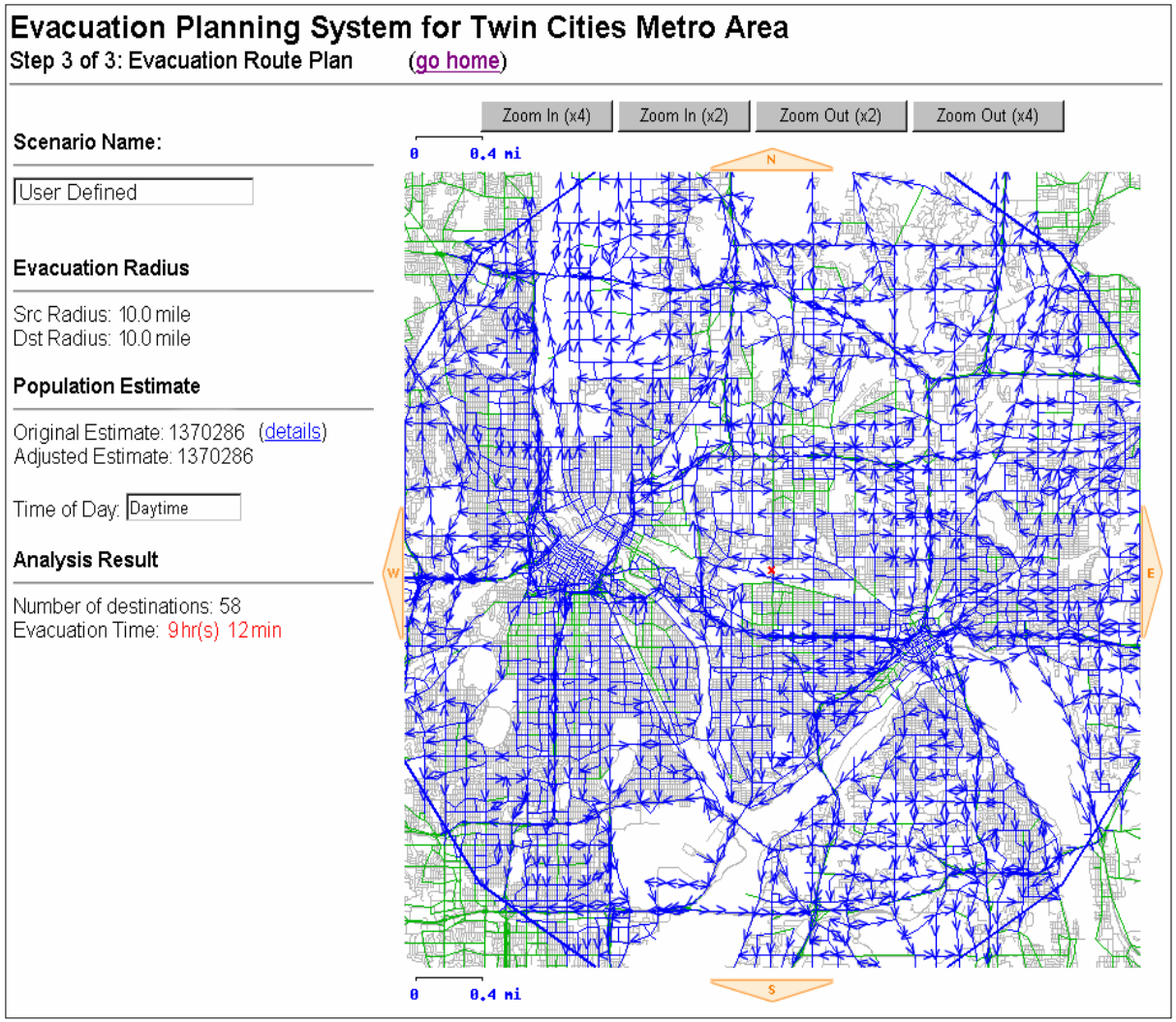

Site Security Planning

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Bio-Chem Neutralization

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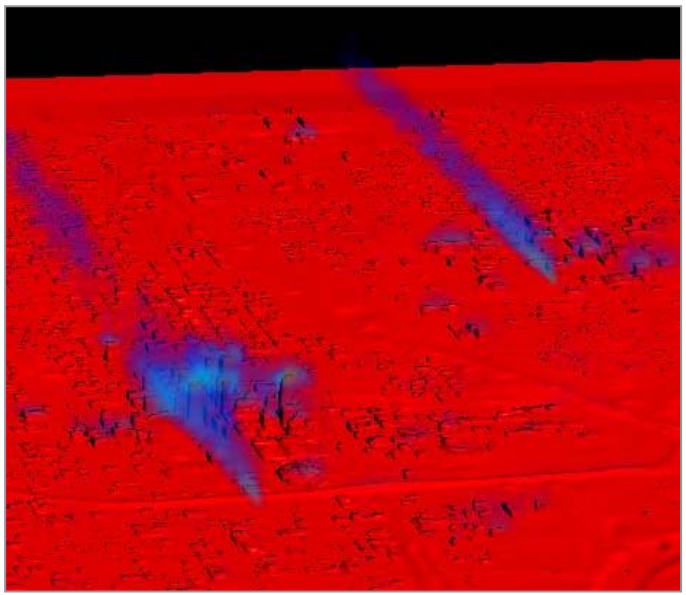
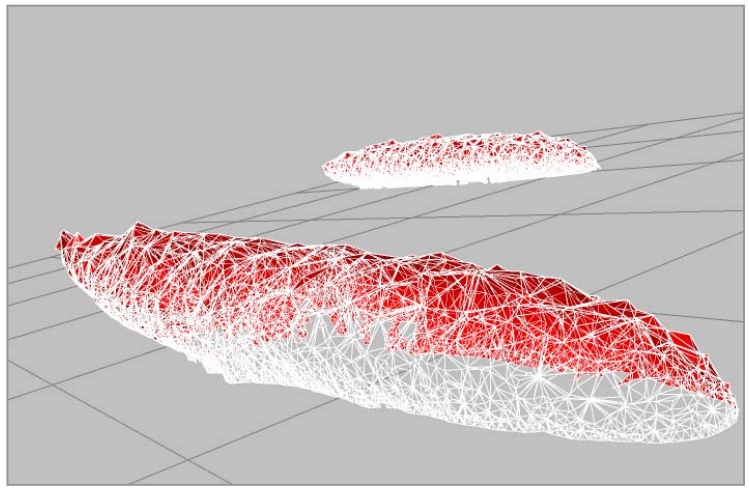


Plume Computational Fluid Dynamics Model



Solid 3D Geometry

Human and Resource Tracking

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- Enable technologies are maturing fast:
  - GPS, wireless, and new generation of tags
  - Digital Angel (producer of GPS, RFID integrated microchips)
  - Ekahau Wi-Fi Real time Location system
  - GPSOne (widely used commercially)
  - BREW (Binary Runtime Environment for Wireless)
- We can track human beings and resources “almost” 24/7

Pathforward

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- Investigate and apply more dual usage technologies and practices (dismounted infantry/ERT member tracking, for example) in HSD
- Combine computer-generated “virtual” environment and objects for personnel training, exercise, and testing

Questions & Answers

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