

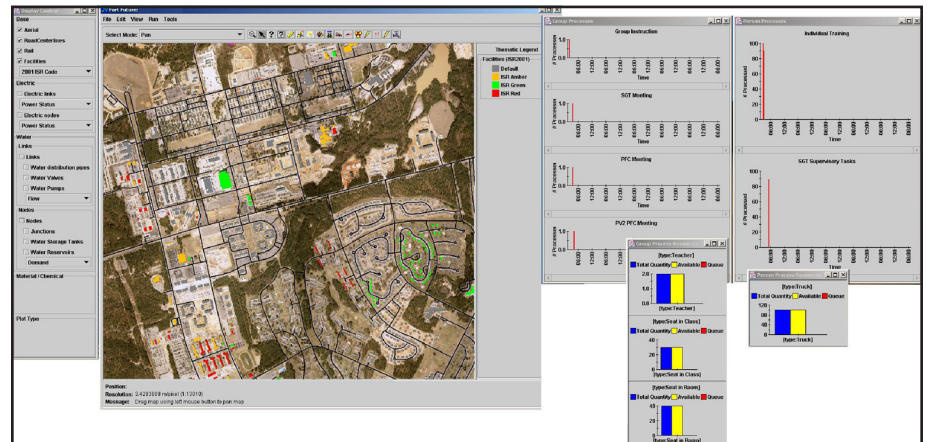
Fort Future: Virtual Installation supports rapidly changing needs of armed forces in the field

The Fort Future research program will provide the Army with the ability to transform existing installations quickly to meet rapidly changing support needs of forces in the field. Argonne National Laboratory supports the Fort Future Program by developing modeling and simulation tools for the Virtual Installation, a generic military installation that becomes specific as data are loaded to describe a particular installation. Minimal required data consist of GIS layers, including attribute data, for building footprints and transportation networks.

Argonne is developing object-oriented simulation and modeling tools that simulate discrete events using the Argonne-developed Recursive Porous Agent Simulation Toolkit (Repast)/Symphony agent-based simulation framework. Argonne has developed three modules for the Virtual Installation: Deployment Modeling; Chemical, Biological, and Radiological Modeling; and Utility Modeling.

Deployment Modeling Module

Deployment processes for a specific scenario can be captured outside the simulation environment and transmitted to the simulation framework, by using XML scripts. Computable objects are then automatically created to represent personnel and equipment belonging to each unit.



FORT FUTURE – Sample screen display from Argonne’s Fort Future modeling and simulation package.

A geographic display of the deployment modeling output shows visualizations of shortest travel paths, facility capacities, resource usage, and current queues.

Chemical, Biological, and Radiological Modeling Module

The Chemical, Biological, and Radiological (CBR) Modeling and Simulation module integrates a leaky-box model with the Hazard Prediction & Assessment Capability model, developed by the Defense Threat Reduction Agency, to determine at any time the level of contamination infiltrating specific buildings based on air-exchange rates and other building-specific information. CBR capabilities include a color-coded display of air-dispersion plumes and buildings by contamination level.

Utility Modeling Module

Argonne has also integrated water and electric utility modeling and planning tools for the Virtual Installation. For water utilities, Argonne uses the Environmental Protection Agency’s EPANet software; for the electrical distribution network, the Argonne-developed DCLoad Flow model was incorporated. These models simulate the effects of utility overload and breakdown on the deployment processes of the Virtual Installation system.

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