Argonne NATIONAL LABORATORY

# National Security

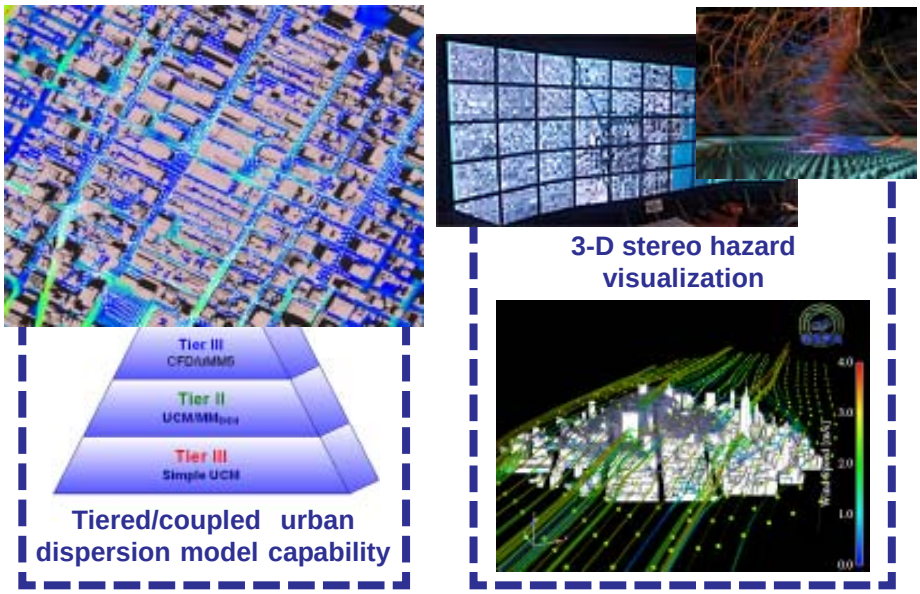
# *Integrated system will help protect Chicago against chemical, biological and radiological attacks*

An innovative urban emergency preparedness and response system is being designed by Argonne National Laboratory for the Chicago 911 Center to help protect the city and its populace in case of a terrorist attack. An attack using radiological, biological, chemical or explosive weapons could cause a large number of casualties, strain available emergency medical and rescue operations, and inflict large-scale economic disruption. Potential terrorist targets include critical infrastructure, such as subway stations, public buildings, and large public gatherings, such as city festivals or sporting events.

A wide variety of counter-terrorism and preparedness measures are now becoming available to:

- Reduce the likelihood of such a catastrophic event,
- Significantly improve evacuation, search and rescue operations and reduce the number of causalities, and
- Speed up recovery times to minimize economic disruption.

The Chicago emergency management system will integrate many subsystems with layered components to provide the range and depth of response capabilities required for rapid and effective response. The project will require the development of some new tools, the use and extension of existing tools, and their integration




*MODELING AND VISUALIZATION – The images illustrate two of five systems that will be integrated with existing advanced communications and surveillance systems at the Chicago 911 Center. Left: Increasingly sophisticated urban canopy parameterized dispersion and meteorological models are coupled and integrated to provide state-of-the-art, time-dependant, urban-influenced hazard-cloud simulations. The image atop the pyramid shows the wind flow and tracer movement in the urban canyon at street level, as generated with a computational fluid dynamics model using wind tunnel boundary conditions from a scale model of Manhattan. Right: A concept plan for next-generation emergency visualization technology for the 911 Center. The lower graphic represents a 3-D stereo image of a toxic cloud as it disperses across Manhattan. The upper images show multiple screens at a 3-D visualization facility and a computer simulation of an F3 tornado.* (Images courtesy of Chicago initiative partners at the University of Illinois Chicago and Champaign-Urbana campuses, and the USEPA/NOAA National Exposure Research Laboratory in Research Triangle Park, N.C.)

with the well established and recognized emergency systems already in place at the Chicago 911 Center. While meeting the emergency needs of response to a weapons-of-mass-destruction attack, the system will also strengthen existing planning and response capabilities for industrial and transportation accidents involving hazardous materials and for natural catastrophes, such as severe storms and tornadoes.

Important tools to be integrated into the system include:

- A three-tiered rapid urban-area and neighborhood-scale modeling system to simulate the movement and dispersal of toxic clouds;
- A next-generation emergency 3-D visualization system to show the spatial and temporal evolution of the hazard cloud and to identify evacuation and sheltering zones, exclusion zones and safe triage areas;
- Effective response plans for specific release scenarios, including potential evacuation of affected and surrounding areas; and
- Assessment of issues that affect safe evacuation and identification of actions to minimize unnecessary individual or population exposures.

Future plans for the system include a detection network to help identify the time, location and strength of chemical, biological or radiological attacks; an urban weather-sensing network to help characterize and monitor the hazardous-cloud dispersal; and the development or adaptation of command-and-control software for crisis management, data assimilation and processing, and communications.

**For more information**

Michael Lazaro
Environmental Science Division
Argonne National Laboratory
9700 S. Cass Ave.
Argonne, IL 60439
Phone: 630-252-3447
Fax: 630-252-3194
E-mail: mlazaro@anl.gov

November 2006