

Advanced Evacuation Modeling Using TRANSIMS

Since 9/11, strengthened security measures and the availability of new methodologies for emergency scenario modeling are needed. Argonne's Transportation Research and Analysis Computing Center (TRACC) and the Illinois Terrorism Task Force are creating a complex model of the Chicago Metropolitan Area to simulate the progress and impact of emergency evacuations from the Chicago Business District.

The Challenge

To successfully model a large urban area like Chicago, while microsimulating on a second-by-second basis the escape movements of all individuals in order to help city officials create a plan to evacuate the city and save as many lives as possible.

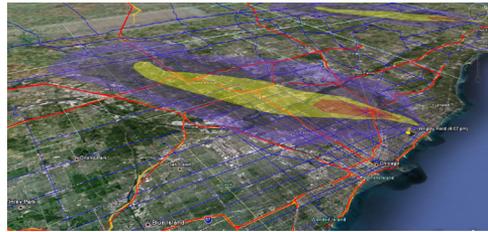
The Solution

Using TRANSIMS (Transportation Analysis and Simulation System), a set of travel software modeling procedures, researchers have simulated the activities surrounding the evacuation modeling project, building the model's major components using TRACC's high-performance computing cluster. Northern Illinois University (NIU) students have worked on data acquisition and verification under the direction of the Chicago Metropolitan Agency for Planning.

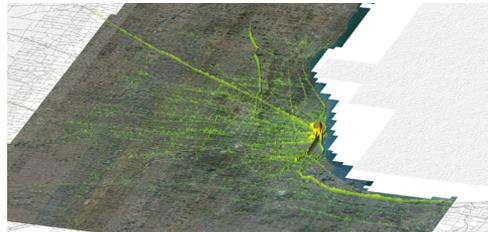
Special methodologies have been developed to modify TRANSIMS' normal traffic forecasting features so they can be applied to more dynamic evacuation scenarios.

The Results

A comprehensive evacuation traffic model has been developed that is being continually improved in subsequent evacuation modeling projects. The road network and trip data has been implemented in TRANSIMS and the functionality of the major components has been verified. Researchers are now working to detect and eliminate modeling artifacts and to improve and correct the road network coding. NIU students are using satellite imagery, aerial photography, and direct observations to improve the accuracy of the road network and its topology. Additional software is being developed to manage the large amounts of data and to run different scenarios on TRACC's high-performance computing cluster.



TRANSIMS models are used for complex and detailed simulations of the highly dynamic effects of evacuations on the underlying transportation system, and can include the response to radiological dispersion patterns to optimize evacuation routes.



Extensive visualization capabilities are being developed to display the massive amount of synthetic data to the user, such as videos of highly detailed three-dimensional congestion patterns across the Chicago Metropolitan Area.

"TRANSIMS allows emergency responders to evaluate regional emergency response plans with regards to their feasibility, and to fully consider the complex interactions of evacuations with the available transportation systems and response strategies," said TRACC researcher Young Soo Park.