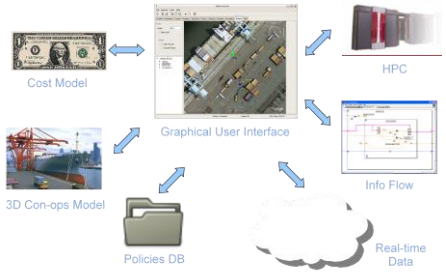
OAK RIDGE NATIONAL LABORATORY
MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY
FACT SHEET

Geographic Information Science and Technology

Improving Port Security through Simulation

Port Operations Simulation Tool

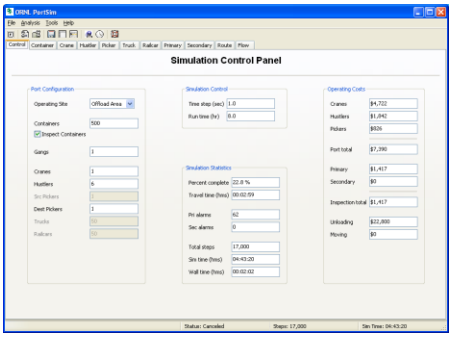
Project Description



PortSim Architecture.

Around the world, there is great concern about the movement of threat materials using seaport shipping containers. The benefit of early detection of weapons of mass destruction is obvious. However, the inspection process needs to be conducted in such a way as to not unreasonably impede normal commerce. Prior to actual deployment of new detection systems, policies, or procedures, it is useful to construct an operational and cost model of the port facility and to run simulations to gage the impact. Using a simulation model beforehand aids decision makers in evaluating tradeoffs. PortSim was developed at ORNL to allow a user to investigate a number of parameters in order to see the impact on port operations and cost. It consolidates a conceptual operations model, cost information, policy and procedures database, a real-time data acquisition capability, and information flow tracking and provides a visualization of port operations in a geospatial environment.

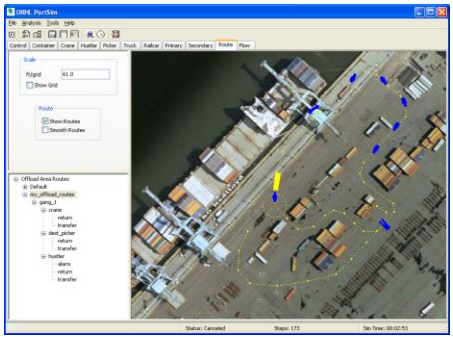
Technical Approach



Simulation Control Panel.

The purpose of the software tool is to allow the assessment of the operational and cost impact of introducing upstream monitoring of cargo containers at a port facility. The questions to be answered largely consisted of two: what changes in normal port operations would be necessitated by the introduction of upstream monitoring; and what are the costs associated with these changes as well as the costs of additional equipment and personnel required. In developing the program, an incremental cost approach was taken. That is, it was not necessary to capture the existing baseline cost structure of the port in its entirety, especially since much of this information does not impact operational costs and is proprietary to the port operating company; it is only necessary to calculate the additional costs of changes in port operations, equipment, and personnel to accomplish the proposed upstream monitoring.

The geospatial interface component serves two purposes. First, it provides a way for the user to specify the routes that the yard hustlers take in the port as containers are offloaded from the ship and stacked in the yard. Second, it presents a visualization of the simulation that allows the user to qualitatively determine traffic bottlenecks and resource deficiencies, among other things, in the port.



Geospatial Interface.

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