Contact
David Smith
Director, Center for Transportation Analysis
Oak Ridge National Laboratory
(865) 946-1324
smithde@ornl.gov
http://cta.ornl.gov

Center for Transportation Analysis

Oak Ridge National Laboratory's Center for Transportation Analysis develops integrated intermodal transportation solutions through innovative and cost-effective research and development. CTA contributes to the efficient, safe and free movement of people and goods in our Nation's transportation systems through seven major research and development focus areas: Freight and Passenger Flows, Transportation Energy Efficiency, Transportation Safety and Security, Supply Chain Efficiency, Climate Change, Vehicle Technologies, and Enterprise Modeling.

Freight and Passenger Flows

Freight and passenger flows use the ORNL Intermodal Network (rail, highway, and waterway) and freight and passenger flow models to generate routes and schedules over the intermodal network. These networks can be used for individual routes or large scale route planning. The US Department of Transportation's Freight Analysis Framework and the National Household Travel Survey are two of the major products that have been developed from the ORNL Intermodal Network and models.

Transportation Energy Efficiency

Transportation energy efficiency involves the analysis of energy efficiency technology adoption rates, such as plug-in hybrids and planning for transportation sustainable infrastructure. ORNL hosts the www.fueleconomy.gov web site and the Fuel Economy Guide brochure that provides gas mileage (MPG), greenhouse gas emissions, air pollution ratings, and safety information for new and used cars and trucks sold in the United States. The Transportation Energy Data Book and its associated Web site are published annually for the US Department of Energy.

Transportation Safety and Security

Transportation safety and security research focuses on making the transportation system and the vehicles using it secure and safe. This includes work in motor carrier and passenger vehicle safety analysis. ORNL is a leader in IntelliDrive research to facilitate a safer, smarter, greener transportation system. CTA works closely with the Department of Homeland Security and Department of Energy to develop technologies to increase the security of freight and passenger movements. Research in this area includes work to enhance the security of transit systems, air cargo, motor carriers, railways, hazardous materials shipments, and inland waterway barge shipments.

Supply Chain Efficiency

CTA develops software systems that can be used to manage or analyze a supply chain to increase its efficiency. This work includes developing software that supports the schedules for freight movements, location of distribution centers, placement of distribution center inventory, and shipment tracking with the use of sensors and reader technologies. Examples of this work include the development of the airlift scheduling system for the Air Mobility Command, a transportation operations model for the Department of Energy to plan spent nuclear fuel shipments, a supply chain analysis of the depot and transportation system for the Defense Logistics Agency, and a supply chain security analysis for a major confectionary company.

Climate Change

CTA's interest in climate change extends to both the impacts of climate on transportation and the impacts of transportation on climate. CTA's intermodal network models are used within a GIS setting to represent the impacts of climate change on the transportation network. Knowledge of transportation's role in product supply chains is used to develop "cradle to grave" life cycle analyses of vehicle, fuel, and infrastructure energy consumption and associated greenhouse gas emissions. CTA staff members are also involved in the estimation of national, metropolitan area, mode, and agency specific carbon footprints.

Vehicle Technologies

CTA's vehicle technologies program is mainly focused on heavy truck safety. Goals of the research are to contribute to reducing the fatalities and injuries associated with truck crashes on our nation's highways, contribute to the economic viability of the US Trucking Industry and reducing emissions from motor carriers. The research is conducted in six research domains: (1) field and test track testing, (2) modeling and simulation, (3) data and information analyses, (4) laboratory testing, (5) demonstration projects, and (6) national program support. CTA has worked with the Federal Highway Administration and the Tennessee Department of Transportation to establish a road side testing laboratory at a weight station on Interstate 81 in northeastern Tennessee. This serves as a field test site for many of the technologies developed by CTA.

Enterprise Analysis

Enterprise analysis is the integrated study of infrastructure, systems, people, processes, and the relationships between them. Enterprise Modeling and Analysis (EMA) may be used to design and implement a security program that is cost effective, comprehensive, integrated, sustainable, and aligned with business and/or organizational objectives. The EMA framework is a data-integration, decision analysis, and knowledge management system that brings together information, advanced analysis, and visualization to help in life cycle assessment of system-of-systems. It enhances the design, development, implementation, and integration of such systems, and provides a mechanism to evaluate system performance with respect to operational effectiveness, risk, economic viability, life cycle sustainability, and enterprise resiliency. CTA uses EMA to develop for Transportation Security systems. EMA for Transportation Security integrates (1) multi-sourced data, to include infrastructure (multi-modal) data, operational data, survey data, and technology performance data; (2) advanced statistical tools to support data quality analysis and anomaly detection; (3) advanced optimization and simulation tools to support effective security system design, technology investment decision analysis, life cycle cost assessment, operations analysis, economic assessment, and network analysis for readiness and resiliency assessment; and (4) geographic and dashboard visualization tools to view and assess the system state.