

**The DHS Science Conference
Fifth Annual University Network Summit**

**Session 15 – Risk, Network and Data Driven Approaches to
Assess Vulnerability of Transportation Systems**

- Moderator: Rod Diridon – MTI
- Speakers: Chris McKay – TSA, Mass Transit and Rail Division
Brian Jenkins – MTI
Nick Lownes – UConn
Mike Greenberg - Rutgers

The DHS Science Conference Fifth Annual University Network Summit

Session 15 – Risk, Network and Data Driven Approaches to Assess Vulnerability of Transportation Systems

Session Themes

- Major national initiative to develop HSR in the U.S.
 - 13 designated HSR corridors
- Limited experience with HSR in the U.S. vs other countries
 - Strong need to develop a security plan for HSR upfront – in the planning and design phases
 - Need for partnering and coordination of efforts – international community, operators, research community (COEs)
 - Basic security measures exist but there is a need for new technologies
- Research methodologies apply generally to complex transportation systems - security of HSR is an important emerging applications

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Problem Statement

- Terrorism aimed at surface transportation systems in the U.S. – such as passenger rail systems – is becoming an increasing concern
- Attacks on mass transit systems (Spain, Madrid) served as a wake-up call
- Man-made attacks or natural hazards on surface transportation systems can result in destructive cascading effects with significant economic consequences
- Security of new systems – such as HSR corridors – should be treated upfront as an integral part of the design process
- There is a need for data specific to terrorist attacks on surface transportation systems to inform decision makers
- There is a need for robust modeling tools to aid in decision making to increase system resiliency
- The problem is highly complex – involving terrorist planning, public response, multi-modal transportation systems, response strategies and economic consequences

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Strategic Approach and Research Methodology

- Produce a dedicated database for terrorist attacks on surface transportation
- Provide immediately useful empirically based information from the database
 - What are the patterns of attacks – what is probability of a second bomb after the first?
- Database, however, does not provide predictive capability
- Develop complementary modeling capabilities that address complexities
 - Models provide predictive capabilities – what if scenarios
 - Models may have different focus and theoretical formulation
- Correlate models with empirical data – realistic information on attacks
- Cross correlate models for validation
- Exercise models to demonstrate predictive capabilities
- Transition database and models to end users – already occurring

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Challenges

- Inconsistent and inaccurate existing records of terrorist attacks on surface transportation
- Availability and collection of input data to calibrate models
- Robust model validation
- Incorporation of realistic human behavior
- Modeling of bi-modal (rail & highway) transportation systems
- Transition modeling capabilities from developmental to operational stage

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Benefits

- Immediately useful information for planners and operators to understand system vulnerabilities from database analysis
- Modeling provides predictive capabilities to inform
 - preemptive planning process
 - alternative design scenarios
 - investment of limited resources
 - response plans and strategies
- Predictive modeling capabilities and tradeoffs analysis for multi-objective design of surface transportation systems – congestion, environment, safety, security, economical and efficiency