Grant Deliverables and Reporting Requirements for UTC Grants

UTC Project Information	
Project Title	Regulating Hazardous-materials Transportation with Behavioral Modeling of Drivers
University	University of South Florida
Principal Investigator	Changhyun Kwon
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Funding Source(s) and Amounts Provided (by each agency or organization)	USDOT: $32,221 USF: $20,446
Total Project Cost	$52,667
Agency ID or Contract Number	Sponsor Source: Federal Government CFDA #: 20.701 Agreement ID: 69A3551747119
Start and End Dates	Start date: 11/30/2016 End date: 11/29/2017
Brief Description of Research Project	This project considers network regulation problems to minimize the risk of hazmat accidents and potential damages to the environment, while considering bounded rationality of drivers. We consider government interventions such as road pricing, roadbans, and curfews for hazmat traffic and/or regular non-hazmat traffic. Consideration of non-optimal behavioral components such as bounded rationality, satisficing, and perception-error of drivers will lead to unique modeling and computational challenges. The proposed multiple-year research is in three phases. In the first phase, we consider a roadban problem for hazmat traffic. While modeling probabilistic route-choice of hazmat carriers by the random utility model (RUM), we consider an averse risk measure called the conditional value-at-risk (CVaR), instead of the widely used expected risk measure. Using RUM and CVaR, we quantify the risk of having hazmat accidents and large consequences, and design the network policy for road bans accordingly. While CVaR has been used in determining a route

for hazmat transportation, it has not been considered in the context of route-choice in hazmat network design problems.
In the second phase, we consider dual toll pricing approaches for both hazmat and regular traffic with behavioral modeling of drivers. In this context, the hazmat traffic pattern will be described by satisficing path problems and the regular traffic pattern will be described by satisficing user equilibrium problems.
In the third phase, we consider a curfew design problem in a time-dependent road network with behavioral modeling. This phase will develop novel modeling and computational methods to consider non-optimal behavior of drivers in a time-dependent road network.
The outcomes of this project will contribute to protecting the road network and the environment from undesirable route-choices that may lead to severe consequences of hazmat accidents.

Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	The goal of this research is to develop an optimization model and an algorithm for potential future use. This project does not intend to implement in actual transportation systems.
Impacts/Benefits of Implementation (actual, not anticipated)	N/A
Web Links • Reports • Project website	http://ctech.cee.cornell.edu/final-project-reports/