FY2016 Statement of Work: Risk Modeling and Communication for TSA and other DHS Organizations

This project will continue on-going work modeling risk and examining perceptions of risk for DHS primarily for the TSA, but will reach out to other DHS organizations including for example FEMA. This work is collaborative with other CREATE researchers primarily William Burns and Richard John.

1. **Theme Area:** Risk Perception and Communication
2. **Principal Investigator:** Robin Dillon-Merrill
3. **Institution:** Georgetown University’s McDonough School of Business and Center for Security Studies
4. **Co-Investigators:** none
5. **Research Transition Lead:** Robin Dillon-Merrill supporting Dr. William Burns
6. **Keywords:** Risk Perception, Risk Inoculation, Transportation Security Risk, Dynamic Aviation Risk Management

7. **Brief Description (1 paragraph description)**
The purpose of this research is to improve first the risk modeling and decision support in DHS organizations and second to support risk communication efforts for DHS after risk modeling is performed. This proposed work specifically supports efforts begun by Dr. William Burns at the TSA. Our focus will be on supporting on-going TSA efforts to strategize for a more dynamic aviation risk management approach but the knowledge and research developed at TSA has broader applicability across DHS.

The goal of risk modeling is to produce results that are as objective as possible – striving to remove from risk computations the influence of preferences, risk attitudes, and judgment biases. But decisions rarely can be made based on such an ideal risk model, because decisions cannot be made without an explicit value system (e.g., such as one’s willingness to pay for the benefits). Our role in the risk modeling efforts for TSA will be to contribute to the development of utility functions and multi-attribute models that quantify trade-offs for example between security effectiveness, cost, industry vitality, and passenger experience. In the course of this research, we will provide decision and risk analysis expertise in developing metrics to quantify the needed utility functions and the corresponding trade-offs, and to strategize future dynamic risk management processes. In parallel to improving the risk modeling efforts at TSA, we will continue working to understand the influence and benefits of risk inoculating messages and near-miss events on future public actions after a significant hazardous event, again here focusing on aviation events to keep the scope of the project manageable.

8. **Objectives (Clear expression of purpose and goals)**
This research will: (a) help improve dynamic aviation risk modeling by the TSA considering both the multi-attribute tradeoffs and the long-term implementation issues and (b) provide recommendations for improving the communication of risk before and after a significant hazardous event (i.e., if a terrorist takes advantage of TSA pre-check to smuggle a bomb aboard an aircraft).
9. **Research Transition Objectives**
This project will develop specific multi-attribute utility models and risk tools to be used by TSA personnel in carrying out their analysis in support of on-going strategy development for dynamic aviation risk management models. The models and tools will be developed in close collaboration with TSA staff. Additionally, we will help as needed supporting a summer CREATE forum for the TSA focusing on modeling and managing risks.

10. **Interfaces to other CREATE Projects:**
This work will maintain a close interface with related projects. The work with TSA is on-going and collaborative with William Burns and Richard John. The broader risk communication work also involves Paul Slovic, Heather Rosoff, and Tim Sellnow.

11. **Previous or current work relevant to the proposed project**
This research will build on the previous work of Drs. Dillon-Merrill and Tinsley perceptions of hazardous events (Dillon & Tinsley, 2008; Dillon, Tinsley, & Cronin, 2011; Tinsley, Dillon, & Madsen, 2011; Tinsley, Dillon, & Cronin, 2012; Dillon, Tinsley, Burns, 2013a; Dillon, Tinsley, Burns, 2013b). Some insights regarding risk communication messages for TSA were identified in a panel survey conducted by Decision Research of Eugene, Oregon in Summer 2013 which we supported.

12. **Major Products and Customers (What are the major products of this effort, and who are the primary clients that are interested in the results.)**
Our on-going research in dynamic aviation risk management is supporting the TSA facilitated by Dr. William Burns. We are further supporting Dr. Burns in his work to improve the risk messaging associated with expedited screening based on theoretical research into risk inoculation and near-misses.

13. **References:**
Major Milestones and Dates (7/1/15 to 6/30/16):
1. Continue supporting development of dynamic aviation risk models. With each iteration of the model, more data will need to be collected from subject matter experts and more refinement will be needed in utility functions from decision makers – July 2015 – June 2016
2. Support CREATE forum for TSA – summer 2015
3. In risk inoculation message research, develop experimental materials for laboratory and field research that test different messaging strategies (i.e., messages that trigger analytical responses versus messages that trigger affective response, etc.) – July 215 – September 2015
5. Develop risk perception models and recommendations in collaboration with Dr. Burns, Dr. Slovic, and Dr. Sellnow – January 2016 – March 2016
7. Present research at the Society of Risk Analysis, December 2015
8. Integrate and document research for journal publication – continually
14. CVs (PI and up to one Co-PI): One page maximum for each.

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Education
1993, M.S./B.S. with Highest Distinction, University of Virginia, Systems Engineering (Advisor: Dr. Yacov Y. Haimes)
1999, Ph.D., Stanford University, Industrial Engineering and Engineering Management (Advisor: Dr. M. Elisabeth Paté-Cornell)

Significant Honors and Relevant Special Appointments
Member, National Academies Committee on Risk-based Approaches for Securing the DOE Nuclear Weapons Complex (2009-2010) National Academies’ Board on Nuclear and Radiation Studies
Member, National Academies Committee on New Orleans Regional Hurricane Protection Projects (2006-2007) National Academies’ Board on Water, Science, and Technology and Board for Infrastructure and the Constructed Environment
Review Panelist, Decision, Risk, & Management Science, National Science Foundation, Fall 2008-Spring 2010.

Relevant Professional Activities
Editorial Board Member, Associate Editor, Decision Analysis Journal
Editorial Board Member, Risk Analysis Journal
Treasurer (2002-2006), Decision Analysis Society, the largest society within INFORMS (Institute for Operations Research and the Management Sciences)

Significant Relevant Publications