

Cost and Benefits of Exit Monitoring Programs
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1. Overview

This work has been an extension of on going efforts to apply tools of risk and decision analysis to support risk management efforts for terrorism security. The underlying challenge the study is addressing is how to make defensible decisions about how and where to allocate resources towards terrorism security when it is difficult to determine the benefits that result from alternative investments. It builds upon completed CREATE work on cost-benefit analysis of the Western Hemisphere Travel Initiative (Willis and LaTourrette), cost-benefit analysis of MANPADs countermeasures (von Winterfeldt and O’Sullivan), and critical infrastructure protection grant programs (Kleinmuntz, von Winterfeldt and Willis).

The primary focus of the work was the US-VISIT program. In 2008, the US-VISIT program developed plans to enhance capabilities to conduct exit monitoring of non-immigrant aliens as they depart the U.S. While discussed as a terrorism security and immigration policy measure, an assessment of the costs and benefits of enhanced exit monitoring capabilities at the land border has not been publicly reported. With a focus of assessing the costs and benefits of exit monitoring of travelers at U.S. land borders, this project sought to further develop generalizeable approaches for conducting cost-benefit analysis of terrorism security measures.

In the process of conducting this study, two parallel risk management efforts developed. The first was assistance to the DHS Office of Risk Management and Analysis (RMA) in support of its effort to connect risk management and budget processes through the Risk Assessment Process for Investment Decision (RAPID). This year, the RAPID process was investigating the potential application of expert elicitation to inform threat and program effectiveness assessments. The second was helping to the California Office of Homeland Security (CA-OHS) develop the investment justification for critical infrastructure vulnerability assessments. For this effort, CA-OHS was looking for ways of assessing the threats, vulnerabilities and consequences from terrorism to of infrastructure protection. Because these are topics relevant to all risk management efforts, helping RMS and CA-OHS evaluate the use of expert elicitation opportunities to learn more about best practices in this regards.

The results of these studies provided several insights about managing terrorism security risk. First, analysis of the US-VISIT program revealed that the program objectives were not clearly specified and objective hierarchies can be improved for many terrorism security programs. Second, work with RMA revealed ways that expert elicitation techniques can be used to support risk management efforts, but the fact that applicability of these methods depends on the resolution of scenarios that are analyzed. Finally, the study with CA-OHS identified approaches for structuring assessments at sector and subsector levels to accommodate limits on available data.

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The findings of these efforts have had direct impact on decisions with all three programs that were involved. With the US-VISIT program, Dr. Willis participated in the Integrated Project Team process and provided comments on the US-VISIT Draft Land Exit Planning Report, which were based upon findings of this study. With RMA, Dr. Willis collaborated with Dr. von Winterfeldt and Dr. Hora to conduct pilot expert elicitations and, based on those elicitations, recommendations to the Director of RMA on how to proceed with the development of RAPID. With CA-OHS, Dr. Willis and Dr. Kleinmuntz advised on how to design and conduct threat, vulnerability, and consequence expert elicitations and conducted analysis of the results to inform prioritization of vulnerability assessments of infrastructure sectors. Finally, this study provided educational opportunities to two USC students, Ashley Howell and Kimberly Lewkowitz, who collaborated on the collection and analysis of data about the US-VISIT program.

2. Research Accomplishments

This study has provided research accomplishments in three areas related to terrorism security risk management: analysis of US-VISIT exit monitoring provisions, assessment of use of expert elicitation in RAPID, and support of CA-OHS investment justifications. The findings of this research, as discussed below, provide guidance on improved methods of benefit-cost analysis for terrorism security.

2.1 Analysis of US-VISIT Exit Monitoring Provisions

Policy discussions of the US-VISIT program point to several forms of benefits including improved immigration processing, enhanced ability of law enforcement to identify fugitive criminals, and improved intelligence capabilities for identifying and tracking terrorists. However, public analysis of exit monitoring provisions of the US-VISIT program is vague about how these objectives are achieved, how achievement is measured, and what the priorities are among them. Thus, early document review and discussions as part of this study identified that the program could benefit from a structured objectives hierarchy for the program. Developing this structured hierarchy will become a focus for follow-on study in Year 5.

2.2 Assessment of Using Expert Elicitation in RAPID

Working with Dr. von Winterfeldt and Dr. Hora, Dr. Willis conducted expert elicitations of threat and program effectiveness. Threat elicitations captured judgments of DHS intelligence analysts about the relative and absolute likelihood of terrorism attack scenarios occurring. Program effectiveness judgments were elicited from DHS Program Analysis and Evaluation (PA&E) analysts and DHS component agency representatives (e.g. TSA, USCG, and FEMA).

These assessments identified several factors that affect the utility of expert elicitation for terrorism risk management. First, when conducting terrorism threat assessments, it is important that the resolution of scenarios be adjusted to reflect dependencies that experts believe are important to their judgment. For example, beliefs about the type of weapon terrorists will choose may be dependent upon what type of terrorist group is conducting the planning. Elicitations must be conducted in a manner that allows flexibility into how judgments are aggregated and disaggregated to match how the experts conceive of the subject matter. Second, frequently multiple experts are needed to assess probabilities for threat scenarios. Specifically, the threat scenarios required judgments both about the modus operandi of terrorist groups and technical difficulty of different attack types. The RAPID elicitations suggest that different, possibly overlapping, groups of people have expertise of these types of information. Finally, judgments of program effectiveness require that assessments be done at a resolution that often matches the resolution of threat assessments, but possibly at a greater resolution. If participants had not previously conducted

detailed program effectiveness assessments they were generally unable to provide judgments at a higher level of aggregation.

2.3 Support of CA-OHS Investment Justifications

Work with CA-OHS revisited a common problem in terrorism security resource allocation; the ability to use methods of optimal resource allocation is limited by the availability of data. In Year 3 work, CREATE investigated an approach that relied on screening risks at a sector level to simplify decisions. In Year 4 work, Dr. Willis and Dr. Kleinmuntz extended this approach for a related decision of choosing specific facilities for which CA-OHS would commission vulnerability assessments. The approach evaluated two extensions. First, the approach involved conducting expert elicitations that required only judgments of upper and lower bounds of threat, vulnerability, consequences, and risk reduction potential. Second, the study investigated conducting these assessments at the sub-sector level as opposed to the facility level. This pilot study suggested that experts were comfortable making these bounded judgments at the sub-sector level. Doing so provided a means of informing judgments that was realistic with respect to the limited time that subject matter experts can dedicate to these efforts.

3. Applied Relevance

As described above, the research efforts of this project were directly related to applied decision problems that terrorism security risk managers face. DHS continues to struggle with how to reflect the benefits of terrorism security efforts in management of its technology acquisition programs. This is relevant for the US-VISIT program, and also for other major acquisition programs including the Secure Border Initiative and nuclear detection projects such as the Advanced Spectroscopic Portal program.

Similarly, most efforts to assess risk management options of terrorism security struggle with assessments of threat and program effectiveness. Expert elicitation has been pointed to as a technique that can provide insight when empirical evidence does not provide a sufficient basis upon which to make decisions. The lessons learned in this study on how to (and how to not) conduct these expert elicitations can be extended beyond RAPID and US-VISIT to other terrorism security programs.

Finally, terrorism security decisions must be made at multiple levels. State policymakers must often make decisions that have implications for individual facilities. However, they often have fewer resources than their counterparts in the federal government and a large number of facilities that they are responsible for. Thus, state-level terrorism security risk managers require analytic approaches that are consistent with both the scale of their problems and the resources they can bring to bear on them. The analysis conducted in this study demonstrated approaches to conducting analysis consistent with the best practices of risk management and expert elicitation, but simplified in ways that allow them to be applied feasibly.

4. Collaborative Projects

Each of the sub-efforts in this project was conducted in close collaboration with federal or state policymakers with responsibility for terrorism security. The efforts involving US-VISIT were conducted in coordination with the formal US-VISIT Land Exit IPT. This is managed by Eve Hermes with contract support from Vanessa Tribastone. Dr. Willis worked closely with Ms. Tribastone at the recommendation of Ms. Hermes. The analysis of expert elicitations for RAPID was conducted in collaboration with Skip Langbehn (Project Manager for RAPID, Homeland Security Institute (HSI)). Results and recommendations were reported to both the RAPID Program Manager (Gordon Garrett, DHS-RMA) and Tina Gabbrielli (Director, DHS-RMA). Finally, the studies for CA-OHS was conducted in collaboration with Kathy McKeever (Assistant Deputy Director, CA-OHS).

5. Presentations

Conferences:

- Willis, H., Jackson, B., “Assessing the Benefits of Terrorism Security,” paper presented at the *Security Analysis and Risk Management Association Annual Meeting*, May 13, Arlington, VA., 2008
- Willis, H., LaTourrette, T., “Challenges of Benefit-Cost Analyses for Terrorism Security Regulations: Observations From Regulatory Analysis of the Western Hemisphere Travel Initiative,” paper presented at the *Los Alamos Risk Symposium*, Santa Fe, NM, 2008
- Willis, H., LaTourrette, T., “Challenges of Benefit-Cost Analyses for Terrorism Security Regulations: Observations From Regulatory Analysis of the Western Hemisphere Travel Initiative,” paper presented at *Society for Risk Analysis Annual Meeting*, San Antonio, TX, December 12, 2007
- Willis, H., LaTourrette, T., “Challenges of Benefit-Cost Analyses for Terrorism Security Regulations: Observations From Regulatory Analysis of the Western Hemisphere Travel Initiative,” paper presented at *INFORMS Annual Meeting*, Seattle, WA, November 4, 2007

Outreach:

- Willis, H., LaTourrette, T., “Challenges of Benefit-Cost Analyses for Terrorism Security Regulations: Observations From Regulatory Analysis of the Western Hemisphere Travel Initiative,” paper presented at the *DHS University Programs Summit*, Washington, DC, 2008
- Willis, H., “Applying Optimal Capital Allocation Methods to Homeland Security Resources: A Case Study of California’s Allocation of the Buffer Zone Protection Program Grants,” invited paper presented at the *ER One Institute's 5th Annual Emergency Preparedness Conference*, Washington, DC, March 3, 2008
- Willis, H., Kleinmuntz, D., von Winterfeldt, D., “Applying Optimal Capital Allocation Methods to Homeland Security Resources: A Case Study of California’s Allocation of the Buffer Zone Protection Program Grants,” invited paper presented at the *DyDAN Homeland Security Seminar*, Piscataway, NJ, 2008
- Willis, H., “Homeland Security Risk Management Challenges Faced by Federal Agencies,” paper presented at *Comptroller General Expert Forum on Risk*, Washington, DC, October 25, 2007

6. Publications

	Ref	Not Ref
1. Willis, H., “Risk Challenges of Applying Risk Management to Terrorism Security Policy Testimony,” submitted for the record to the House Homeland Security Committee, Subcommittee on Transportation Security and Infrastructure Protection, June 24, 2008		x
2. Willis, H., LaTourrette, T., “Using Probabilistic Terrorism Risk Modeling For Regulatory Benefit-Cost Analysis: Application to the Western Hemisphere Travel Initiative Implemented in the Land Environment,” <i>Risk Analysis</i> , 28, 325-339, 2008	x	
3. Willis, H., “Using Risk Analysis to Inform Intelligence Analysis,” working paper, RAND Corporation, WR-464-ISE, Santa Monica, CA, 2007		x