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DHS Workshop

Homeland Security: New Challenges for Decision-Making Under Uncertainty

Washington, D.C.

Final Report

February 2004

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This report was prepared by the workshop organizers at Lawrence Livermore and Sandia National Laboratories, who are responsible for its contents.

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Abstract
A workshop addressing the decision-making challenges confronted by the United States Department of Homeland Security (DHS) in the face of large uncertainties, complex value systems, and multiple stakeholders was held November 13-14, 2003, in Washington, D.C. Forty-six participants drawn from the DHS, other government agencies, universities, national laboratories, and the private sector attended the workshop. The goals were: 1) to develop a common understanding of the range of decisions DHS program elements must make; 2) to review selected examples of decision processes and approaches used by other organizations for similarly complex problems; and 3) to recommend steps DHS can take to ensure high quality decision making. The workshop brought together diverse perspectives on decision making in the context of complex risks. Participants included those who must make decisions affecting homeland security, those who have faced risky decisions in other domains, and those who have developed theoretical and practical approaches to high quality decision-making.

The workshop was sponsored by the Science & Technology (S&T) Directorate, but was intended to address issues of concern to the three DHS operating directorates as well as S&T. The purpose of this breadth was to identify areas in which S&T capabilities and resources could be valuable to DHS as a whole. The workshop consisted of three main segments:

1) Presentations by managers from DHS Directorates, reflecting the diverse nature of decision making across DHS;
2) Presentations on four alternative approaches used to address problems in both government (counter-terrorism R&D investment; identification of critical capabilities in bioterrorism) and the private sector (corporate strategy development; terrorism insurance); and
3) Breakout groups chartered to identify barriers and propose actions to address them, in each of five decision classes: 1) Portfolio management; 2) Grant allocation; 3) Critical one-time policy decisions; 4) Real-time operational decisions; 5) SAFETY Act implementation.

This report summarizes the proceedings of the workshop, including recommendations for next steps.

1.0 Introduction

The Department of Homeland Security (DHS) must make difficult decisions in the face of large uncertainties and potentially catastrophic consequences. Challenges arise from such factors as:

- Intelligent adversaries with uncertain motivations and capabilities
- Multiple and difficult to articulate U.S. protection objectives
- Wide range of threats and many potential targets
- Uncertainty about effectiveness of countermeasures that could interdict threats or mitigate consequences
- Need to balance short-term and longer-term actions
- Distributed responsibility for protection (federal, state, and local governments; private sector)
- Need for transparency and public acceptance of government actions to address the threats

The DHS S&T Directorate has emphasized the importance of a defensible basis to support homeland security decisions, while addressing these challenges. The workshop facilitated development of a common understanding of the policy and technical aspects of decision-making in the homeland security context. Decision classes addressed included R&D portfolio management; grant allocation; one-time policy decisions; real-time operational decisions; and the special needs of the SAFETY Act implementation. Participants recommended possible next steps that DHS can take to ensure effective and acceptable processes, including communicating risk management strategies to stakeholders.

2.0 Workshop Proceedings

The workshop Agenda, Overview, Participant List, and Breakout Group Structure are included in **Appendix A**. As shown in the participant list, the workshop included forty-six people from government, academia, industry and the national laboratories. Participants brought perspectives on government decision making, risk-based decision making methodologies, practical processes for organizational decision-making, and the unique aspects of homeland security.

This section includes brief summaries of all the presentations, both from DHS staff and from outside experts on alternative decision-making approaches. Many of the talks used briefing slides. For those presentations, the slides are included in **Appendix B** (available separately on CD-ROM).

2.1 Opening Remarks on Workshop Motivation

Penrose Albright, Assistant Secretary for Programs, Plans, and Budgets in the S&T Directorate, provided opening remarks to set the stage for the workshop. Assistant Secretary Albright noted that DHS decisions will be scrutinized and emphasized the importance of instituting quality, transparent decision processes that will stand up to scrutiny by many stakeholders in budget debates or post-event justification of decisions. He asked the group to consider the extent to which existing frameworks and methodologies from the decision and risk analysis communities could be used to address some of the complex DHS technology investment and operational risk management decisions. Complicating factors include uncertainty about threats, uncertainty about consequences of attacks, and satisfying multiple stakeholder interests. He challenged workshop participants to:

- Develop a common understanding of decision problems faced across DHS, including both S&T and the operating directorates;
- Describe how best practices for decision making in other government agencies and private sector might apply to DHS;
- Identify a framework(s) for ideal DHS decision processes; and
- Recommend near-term follow-on steps and a longer-term strategy for implementing decision and risk analysis approaches within the S&T Directorate

2.2 Decision Making in DHS Operating Directorates

Representatives from the three DHS operating directorates, Information Analysis and Infrastructure Protection (IAIP), Border and Transportation Security (B&TS), and Emergency Preparedness and Response (EP&R), presented illustrative examples of the types of decisions they make and the factors they consider critical to good decision making.

Clyde Layne, representing the IAIP perspective, described how uncertainty with respect to threats, vulnerabilities, and consequences drives the need for risk assessment to support tactical responses to current threat indicators, communication of risk to the public and leadership, resource allocation for preparedness and response, and resource allocation for R&D. He cited a need to develop practical conceptual approaches to dealing with uncertainties. He further cautioned that uncertainties are so extreme that they may preclude development of highly quantitative and complex risk assessments.

Al Gina, Agency Coordinator, and Jon Batt, Senior Policy Advisor, presented two perspectives from B&TS. They provided an overview of operational and strategic decisions made in B&TS. These decisions include:

- Decisions impacting operational procedures/effectiveness
- One time enforcement/admissibility decisions (conveyances, cargo, people)
- Significant policy decisions that will alter the way we do business
- Hiring, procurement and deployment decisions/strategies (personnel/equipment)

They discussed the need to balance enforcement concerns with the requirement to facilitate commerce when making these decisions, and the challenges of translating high-level policy directives into day-to-day operational decision rules. They emphasized the need for communication and coordination of policies within the B&TS Directorate, among DHS directorates, and between DHS and other agencies. Al provided an anecdote that underscored the need for coordination and a systems view of DHS. He explained that in a recent decision he had to ensure that all stakeholders that required notification prior to implementation of a policy were identified. In one case, he was unaware that certain offices even needed to concur. He suggested a need to "map" the DHS organization so that a decision maker could easily identify all stakeholders that would be affected by a decision.

Darrell Darnell of the B&TS Office of Domestic Preparedness described the $4 billion grant program his Office oversees. He indicated that formulae are used to determine allocation of grant funding so that no decisions are required on his part. Several workshop participants suggested that grant allocation formulae might be developed that more accurately reflect risks to regions, industry sectors, or point targets. Use of such formulae would more effectively distribute grants to manage risks.

Steve Sharro, Division Director of the U.S. Fire Administration Training Division, and Brian Cowan, Director, Grants Program Office, U.S. Fire Administration, of the EP&R Directorate described training and fire grants programs administered by the Directorate. Steve discussed decision processes used to declare a region a national disaster area and to allocate resources to this region. Brian described how requests for federal resources for firefighting are evaluated.

2.3 Decision Making in the DHS Science and Technology Directorate

Portfolio managers for the radiological/nuclear, chemical/biological, and infrastructure protection portfolios in the S&T directorate described how they manage their research and development portfolios. Each manager indicated that uncertainty about the threat was a particularly challenging element of his or her decision. Each manager also described the

difficulty of determining the contribution of an individual countermeasure component or technology to the overall level of protection afforded by the system.

John Vitko, S&T Portfolio Manager for Chemical and Biological Countermeasures, faces difficult decisions regarding threat prioritization (e.g., threat driven vs. capability driven; small vs. large), countermeasure architecture design (e.g., multi-layer interdiction vs. rapid detection and response), and performance requirements for key components of the architecture. His planning horizons for these decisions are keyed to one-, three-, and five-year performance goals as measured against seven end-to-end reference attack scenarios (four biological and three chemical attacks). Bio defense technology is needed to identify the source and estimate the extent of contamination. He emphasized the need for early detection and effective communication for responders and the public. He also discussed consequence management issues.

Judy Kammeraad, S&T Portfolio Manager for Radiological and Nuclear Countermeasures, said that her focus was on a zero-to-five-year event horizon. In that context she was interested in developing tools for consequence and crisis response such as radiation emission detection sensors and networks. She emphasized the need to demonstrate that detection systems or other technology investments actually increase security. In terms of decision-making processes, she noted the need to define "acceptable" risk, the need for a clear, transparent process that allowed mid-course corrections, and the need to build incentives to encourage cooperation.

John Cummings, S&T Portfolio Manager for Critical Infrastructure Protection, discussed uncertainties related to the "threat space" including threat likelihood and prioritization for attacks on fourteen infrastructure systems and key national assets. He also noted uncertainties related to asset vulnerability. John also discussed the need to consider the technology customer – e.g., IAIP, state and local law enforcement, or other stakeholders.

Holly Dockery, S&T Portfolio Manager for SAFETY Act, gave an overview of the background and special challenges associated with implementation of the Congressionally enacted "Support Anti-Terrorism by Fostering Effective Technologies Act of 2002" (known as the SAFETY Act). This Act is intended to provide limited liability to vendors of anti-terrorism technologies to improve homeland security. Although general criteria have been set to determine eligibility for protection under the Act, the processes to evaluate whether the criteria have been met for any specific case are still under development.

2.4 Case Studies

Four "case studies" were featured to illustrate alternative approaches to decision making under uncertainty. Three of the cases were focused on terrorism and security specifically and the fourth considered a decision process that has worked well in large, mainly private sector, organizations.

1) *Risk-based counter-terrorism R&D investment (Cam Boulet, Director of the Chemical, Biological, Radiological and Nuclear (CBRN) Research & Technology Initiative (CRTI)).* Cam described how the September 2001 and the subsequent anthrax letter attacks focused attention on CBRN counter-terrorism preparedness in Canada. He described the use of a structured scenario-based risk assessment to develop S&T investment priorities and strategies. The risk assessment,

which involved broad participation of the S&T, intelligence, response, and security communities, has resulted in eight investment priority areas that address a broad capability-based approach to CBRN terrorism response. Critical to the success of the risk assessment and S&T investment decision process was the use of about 80 briefly worded attack scenarios, covering a broad range of CBRN threats and targets. Judgments from area experts were used to assess consequences of the scenarios. Independent judgments from the intelligence community were used to assess the likelihood of the scenarios. The resulting risk assessment was used to prioritize needs and to guide the S&T project solicitation and selection process for Canada.

2) *Capabilities-based approach to bioterrorism (Richard Danzig, Consultant and former Secretary of the Navy).* Richard presented a high-level integrated view of the challenges facing senior government decision makers and their supporting bureaucracies in dealing with bioterrorism. In addition to the great uncertainty about the threat, a major challenge derives from the multiple perspectives of the many communities owning a piece of the responsibility (e.g., intelligence, public health, national security, emergency response, local security, science and technology, public communication). Because the threat is relatively new, a common language and operational understanding of the threat implications on preparedness and response has not yet developed among this diverse set of backgrounds and world views. The use of a small number of planning scenarios was suggested as a means of focusing planning resources, of communicating a simply understood message to those who must implement, of evaluating the effectiveness of alternative defense investments, and ultimately for setting requirements and standards. The concept of a biodefense capabilities "scorecard" was proposed to measure effectiveness across the set of capabilities and where specific efforts should be concentrated.

3) *Corporate portfolio strategy development (Dan Owen, Managing Director, Strategic Business Processes, Inc.).* Dan described a "dialogue-based" approach to decision-making that has been implemented successfully in a number of corporations including General Motors and IBM. The process focuses on the reality that no individual in a complex organization has a complete understanding of the entire enterprise. By establishing a framework in which the diverse perspectives can be shared and discussed, a higher-valued "hybrid" strategy can result. Best practice portfolio management requires a framework for dialogue, tools for coherent decision-making and integration with the budget process. The four main steps in the generic process – Framing, Alternatives, Analysis, and Connection – were discussed. Examples were given to illustrate how the process helps identify and communicate among the management team the sources of value and risk within the alternatives initially proposed. The use of supporting analytical tools, such as influence diagrams, strategy tables, and tornado diagrams to deal with uncertainty, was described as a critical, but largely "behind-the-scenes" element of the process.

4) *Insurance decisions on terrorism risk (David Miller, Principal Engineer, Risk Management Solutions, Inc.).* David presented the perspective of the insurance industry in managing terrorism risk. He highlighted the industry reaction to the September 2001 attacks and posed a number of key questions that insurers are currently asking. These questions include "How can terrorism risk be managed?"; "Where are significant exposures/accumulations?"; "What is the potential for more lethal attacks (e.g. CBRN)?"; "What other unrecognized large loss scenarios exist?" Key sources of uncertainty in loss modeling were discussed, including uncertainties around the nature of the threat (frequency of attack, targets, attack modes), the loss amount, model parameters,

contractual issues, and the political reaction to a major event. Risk management can benefit from consequence modeling and probabilistic risk assessment to generate "exceedance probability" vs. "loss" curves that allow insurers to manage loss accumulation (e.g. through underwriting). The difference in risk metrics used by the insurance industry (financial metrics only) and those appropriate for public policy (social, political, and financial) were identified.

2.5 DHS Organizational Overview

Prior to the formal breakout into small discussion groups, Holly Dockery provided an overview of the DHS organizational structure and mission areas of responsibility. This was useful to many of the non-DHS participants and to some of the DHS attendees. Her presentation ended by emphasizing the importance of the workshop goal: "Provide DHS management with a consistent, defensible, and valid decision making framework."

2.6 Breakout Groups

Each workshop participant was assigned to a breakout group. Each breakout group was charged with addressing a specific decision problem class: 1) portfolio management, 2) grant allocation, 3) critical one-time policy decisions, 4) real-time operational decisions, and 5) SAFETY Act decisions. The groups reviewed DHS decision challenges articulated by the S&T and operating directorate managers. They considered the case studies and experience of group members to identify effective and defensible decision process elements for their assigned decision problem class. Breakout group efforts were focused on answering the following three questions:

- What is the greatest obstacle to good decision making at present?
- What system would you recommend for good decision making in the future?
- What first steps would you recommend to achieve an optimal system?

In the final session of the workshop, each breakout group presented its observations and recommendations regarding next steps for DHS. **Appendix A** contains the breakout group charter and assignments. **Appendix C** contains summaries of each breakout group discussion as well as each group's presentation to the entire workshop.[1]

3.0 Key Observations

The workshop was highly interactive, with many comments and observations offered during the DHS Directorate and case study presentations. In general, participants perceived the workshop as a valuable opportunity for interaction (specifically among the DHS staff from different directorates) and nearly all participants stayed for the entire workshop. Many participants agreed that some elements of the diverse set of decision processes presented in the case studies could help address DHS decision problems. The following observations represent only a fraction of the many observations made during the workshop:

- Coordination among DHS organizations can be improved. Interaction and communication are infrequent and organizational and process interfaces within and external to DHS are not clearly defined. Furthermore, overall strategy and objectives are not consistently shared by component organizations (e.g., operational directorate needs are not sufficiently driving technology development). Finally, effective practices exist in some areas, but are not widely known.

[1] The breakout session presentations and summary reports are included without modification to reflect general discussion at the final workshop session. In addition, the groups' recommendations may not reflect a full understanding of current or planned DHS activities.

- Practical, conceptual approaches for dealing with uncertainties about threats, vulnerabilities, and consequences are needed.
- Most grant allocation decisions are not risk-based, and implementation is not always aligned with the intent of the program.
- Decisions are made on individual technologies without sufficiently evaluating the effect on system performance.
- Decision process framework development should focus more on effectively incorporating ongoing analyses. A decision *process* is distinct from, but includes, supporting *analysis.*

4.0 Recommendations

Each of the five breakout groups recommended near-term actions to facilitate current processes and to develop ideal processes for the long term. The recommendations from all groups are consolidated in Table 1. Some recommendations focus on issues within the S&T Directorate while others address DHS-wide issues. No attempt was made to prioritize the recommendations during the workshop. The following short list, developed by the Steering Committee from the aggregate set of recommendations, highlights the major points raised at the workshop.

Science and Technology Directorate-Focused Recommendations

1. Pilot a structured process for developing a comprehensive S&T strategy within each portfolio and across portfolios
2. Establish area teams, consisting of outside experts, to be on call as needed
   - Public policy, opinion and communication advisory team
3. Develop contingency plans for rapidly fielding developmental systems in response to crises or political demands
4. Develop detailed guidance on rules for each of the seven SAFETY Act criteria

DHS-Wide Recommendations

1. Develop a "map" of DHS as a single system to facilitate communication and coordination and decision making
2. Develop a risk management process based on an integrated threat-vulnerability-consequence analysis
3. Further develop risk-based methodology for grant allocation; build on effective processes from existing grant programs (e.g., FEMA fire grants)

Table 1. Summary of Breakout Group Discussions

Questions Posed to Each Breakout Group	Group 1: Portfolio Management	Group 2: Grant Allocation	Group 3: One-Time Policy Decisions	Group 4: Real-Time Operational Decisions	Group 5: SAFETY Act
"What is the greatest obstacle to good decision making at present?"	1) Gaps in coherence and integration of the decision making processes used within DHS as a whole and within S&T	1) Congressional requirements not always risk based 2) Decision processes fragmented 3) Overlapping programs 4) Lack of data on threat 5) Synergies not recognized and captured across grant programs		Obstacles – complex mission space, too much data, data does not match context (pre-, during, and post-event), don't understand DHS roles & responsibilities, merging of cultures, language & definitions (e.g., removal, apprehension, detention), clearances, not understanding big picture, connections, no spanning scenarios/playbooks.	1) System for communications with regard to the SAFETY Act should be improved: - Congress - Applicants - Customers 2) Lack of prior experience - No precedents for criteria 3) Resource constraints 4) Support mechanisms 5) Detailed criteria/basis for decisions is not available
"What system would you recommend for good decision making in the future?"	Vertically integrated, horizontally coherent, and robust system within a consistent, defensible, and valid decision making framework	1) Establishes and communicates priorities 2) Transparent process for evaluating alternatives 3) Quality process that will be recognized by Congress 4) In sync with legislation and funding cycles 5) Ensures that end users are strongly linked into process 6) Need to identify cross-cutting influences and needs Suggest emulating FEMA fire grant program		1) Vision – Implement and exercise "plays" with allowance for initiative – well organized and trained team. 2) Attributes of high quality process – include relevant stakeholders, well-defined roles & responsibilities, clear/credible (not too many buttons on the remote), transparent, implemented in training (playbooks/ scenarios), appropriate timeliness.	1) Detailed rules exist for each decision that are: - Consistent and repeatable - Validated and broadly accepted - Widely publicized 2) Process is flexible (rules are guidelines) 3) Feedback/communications system exists for DHS internally, applicants customers and the general public 4) Process exists for strategic evaluation to determine: - If the goals of the law and Congress being met - If the law is supporting DHS objectives 5) Resources are available to implement the vision.
"What first steps would you recommend to achieve an optimal system?"	1) Establish an inter-directorate, inter agency group to define a manageable number of scenarios to begin strategy formulation 2) Establish a	1) Identify incremental steps for creating synergies across grant programs 2) Evaluate applicability of FEMA fire grant program to other	1) Development processes must focus on end users, ensuring cradle-to-grave understanding of programs from the start, including its incorporation in standards. 2) S&T should develop contingency plans for accelerating the evaluation and implementation of programs, in response to crises or political demands.	1) Near-term: integrate analysts into problem owners' space to understand spectrum of needs – scope the problem. Initiate cross-training to foster understanding across	1) Develop a strengthened, more formal communications strategy: a) Enhance "outreach" activities b) Strengthen "In-reach" activities 2) Develop detailed guidance on rules for each of the 7 criteria and the other decisions that must be made.

	structured process for development of S&T portfolio strategy 3) Establish a structured process for program definition	programs 3) Workshop on grants programs that brings in DHS granting organizations; follow-on workshops would bring in grant recipients	3) S&T should organize in a matrix pattern, on a sustained basis, to focus on major problems (e.g., bioattack). 4) S&T should establish teams of experts, outside the chain of command, familiar with one another and practiced in task, to be on call as needed. They could be called a BEAT (Biological Emergency Advisory Team), ChEAT (Chemical), NEAT (Nuclear). 5) S&T should establish a Policy Analysis Group of Experts (PAGE), to advise on political, public opinion, etc., aspects of S&T topics. 6) S&T should routinely bolster the credibility of its work by employing eminent expert review (e.g., NAS committees, commissions). 7) S&T should complement many projects with public opinion research, including methods that consider informed public responses. 8) S&T should routinely use pilot programs and demos (with proper evaluation). 9) S&T should promulgate best practices in decision making (e.g., mobilizing requisite set of experts, covering all relevant topics; identifying the full set of relevant health, security, and economic outcomes). 10) S&T should continuously reassess threats, including red-teaming for emerging threats.	"stove-pipes." Map processes to be sure all relevant stakeholders included. Top-down, bottom-up and "mature agencies" in lead. 2) Long-term: After understand needs, deploy/pilot tools; develop & validate "living playbooks" (includes demonstration of incorporation of lessons learned) to drive training and responses.	a) Use internal and outside experts as appropriate. b) Assemble panel of key stakeholders in some areas. c) Review resulting detailed rules with key stakeholders: - Potential applicants - Experts - Other stakeholders such as the insurance industry. 3) Long term – Develop a strategic plan to measure results and to consider changes to the rules and the act.

5.0 Conclusion

The workshop was viewed as a valuable forum for information exchange, particularly among the DHS attendees. It was noted that opportunities for the different directorates to interact are rare and that important organizational interfaces are not well established. Future workshops similar to this one could be a useful mechanism to foster cross-directorate communication and coordination.

The workshop succeeded in making significant progress toward the goals established by Assistant Secretary Albright. Given the breadth of decision problems addressed and the diverse organizational and personal perspectives represented at the workshop, it is probably true that more questions were raised than answered. Establishing a deep common understanding of the DHS decision problems will take time and more frequent interaction. But the workshop represents an important first step. Likewise, the case study presentations brought very relevant decision-making approaches to the attention of representatives from across DHS. There was not sufficient time to engage in a full discussion of the relative merits of each approach or how an approach could best be tailored for DHS.

We did not come to consensus on an ideal framework for DHS decision-making. However, many desirable features were identified in the presentations and discussions by the large group, as well as in the breakout groups. The workshop did not address directly the question of whether a single framework can effectively apply across the range of decision classes considered. It would be useful to convene follow-on workshops focused on a particular class of decisions. This would allow more time to evaluate alternative decision process and analysis methodologies within a specific context.

Appendix A – Workshop Handouts

Agenda
Overview
List of Participants
Breakout Group Charter and Assignments

AGENDA

Homeland Security: New Challenges for
Decision Making Under Uncertainty
A Department of Homeland Security Workshop

November 13-14, 2003
University of California Washington Center
Washington, DC

Thursday, November 13

8:00-8:30 Continental Breakfast

8:30-8:45 Welcome and Introductions
Richard Wheeler**,** Lawrence Livermore National Laboratory

8:45-9:00 Workshop Motivation
Parney Albright, DHS S&T.
The importance of quality decision processes, which incorporate "best practices" and address the challenges of homeland security, will be described.

9:00-9:15 Workshop Objectives
Michael Nacht, University of California at Berkeley.
The goals of the workshop, agenda outline, and roles of participants will be reviewed.

9:15-12:30 Overview of DHS Decisions
Goal: Characterize range of DHS decisions, identify current effective practices, and specify desired features (needs) of decision processes.
Operating Directorate Presentations:

Information Analysis & Infrastructure Protection (IAIP)
Border & Transportation Security (BTS)
Emergency Preparedness & Response (EPR)

Science &Technology (S&T) Directorate Presentations:
Judy Kammeraad, Radiological and Nuclear Countermeasures
John Vitko, Chemical and Biological Countermeasures
John Cummings, Critical Infrastructure Protection
Holly Dockery, SAFETY Act

Decision processes supporting S&T and operating directorate functions include R&D portfolio management, countermeasure deployment, grant programs resource allocation, critical one-time policy decision, and real-time operational decisions. This session will highlight the various types of decision problems, along with the most important factors shaping the decision, from the perspective of current DHS decision makers.

12:30-1:00 Working Lunch – General Discussions

1:00-5:00 Case Studies
Goal: Examine decision processes in other government and non-government environments for applicability to DHS.
Moderators: Jim Dyer, University of Texas; Tom Edmunds, Lawrence Livermore National Laboratory

These case studies illustrate alternative approaches to representative decisions similar to those DHS faces. Important elements of each decision process, such as articulation of objectives, representation of uncertainty, and development of consensus among diverse stakeholders, will be discussed. Lessons learned, particularly experience in implementing decision processes, will be highlighted.

1. Risk-based R&D prioritization in Canada (Cam Boulet) – threats, scenarios, and consequence analysis for budget allocation
2. Capabilities-based approach for policy decisions (Richard Danzig) – informal expert elicitation to identify gaps in capabilities to address given threat scenarios (e.g., vaccination policies)
3. New product portfolio management (Dan Owen) – private sector investment decisions given uncertain payoffs, process for achieving consensus through structured dialogue, robust hybrid solutions
4. Risk management via insurance (David Miller) – industry terrorism risk premiums and relationships to government grant allocation decisions

5:00-5:30 Breakout Group Assignments
Breakout groups will be assigned and chartered for the remainder of workshop. Breakout by taxonomy of DHS decision applications as follows: 1) portfolio management, 2) grant allocation, 3) critical one-time policy decisions, 4) real-time operational decisions, and 5) SAFETY Act. Each group will be charged with documenting key observations and generating actionable process recommendations for DHS by the end of the workshop.

6:30 Working Dinner
Seating at local restaurant by breakout groups. Begin discussions on assigned topic.

Friday, November 14

8:00-8:30 Continental Breakfast

8:30-9:00 Review of Breakout Group Charters and Issues

9:00-11:00 Breakout Groups
Breakout groups consider DHS needs and case studies to identify most important process areas needing further development. Groups recommend elements of decision processes that will address the class of DHS decision problems assigned to their group.

11:00-12:00 Summary of Breakout Session Findings
Each working group will present its analysis and recommendations.

12:00-12:30 Recommended Next Steps
Generate recommendations and options for a path forward (e.g., pilot application for S&T or an operating directorate, additional workshops that focus on individual problem types or process elements, specific gaps identified requiring longer-term research).

12:30 Working Lunch – Closing Remarks

1:30 Adjourn

WORKSHOP OVERVIEW

Homeland Security: New Challenges for
Decision Making Under Uncertainty
A Department of Homeland Security Workshop

November 13-14, 2003
University of California Washington Center
Washington, DC

The Department of Homeland Security (DHS) must make difficult decisions in the face of large uncertainties and potentially catastrophic consequences. Challenges arise from such factors as:

- Intelligent adversaries with uncertain motivations and capabilities
- Multiple and difficult to articulate U.S. protection objectives
- Wide range of threats and many potential targets
- Uncertain effectiveness of countermeasures that could interdict threats or mitigate consequences
- Need to balance short-term and longer-term actions
- Distributed responsibility for protection (federal, state, and local governments; private sector)
- Need for transparency and public acceptance of government actions to address the threats

Motivation and Goals: The DHS Science & Technology Directorate has emphasized the importance of a defensible basis to support homeland security decisions. The goal of this workshop is to develop a common understanding of the policy and technical aspects of decision-making in the homeland security context. Decision classes addressed will include R&D portfolio management, grant allocation, one-time policy decisions, and real-time operational decisions. We will identify decision-making needs and specify the desired elements of decision-making processes that address the challenges listed above. A second goal is to identify initiatives that could be undertaken to ensure effective and acceptable processes, including communicating risk management strategies to stakeholders.

Content and Format: The workshop will include participants from government, academia, industry and the national laboratories. Participants will bring perspectives on government decision making, risk-based decision making methodologies, practical processes for organizational decision-making, and the unique aspects of homeland security. The format of the workshop includes the following discussion modules.

- Nature of DHS Decisions
- Desired Features of a Decision Making Process
- Case Studies Highlighting Different Approaches to Complex Decision Making
- Identification of Process and R&D Needs (Breakout group format)
- Recommendations and Next Steps

This workshop will be highly interactive, with presentations intended to guide discussions among the participants. The case studies will involve more substantial presentations, but will still serve primarily to focus a deeper collective discussion.

The principal product of the workshop will be a summary report with key observations and recommendations for the DHS S&T Directorate. The report will be shared with all workshop participants.

WORKSHOP PARTICIPANTS LIST

Homeland Security: New Challenges for
Decision Making Under Uncertainty
A Department of Homeland Security Workshop

November 13-14, 2003
University of California Washington Center
Washington, DC

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WORKSHOP BREAKOUT GROUP CHARTER

Homeland Security: New Challenges for
Decision Making Under Uncertainty
A Department of Homeland Security Workshop

November 13-14, 2003
University of California Washington Center
Washington, DC

Charter: Each breakout group will address one of five decision problem classes: 1) portfolio management, 2) grant allocation, 3) critical one-time policy decisions, 4) real-time operational decisions, and 5) SAFETY Act. The breakout groups should informally discuss their topic area during dinner on Day 1. On the morning of Day 2, the groups should review DHS decision challenges as articulated by the S&T and operating directorate managers. In addition, each group should reference the case studies and experience of group members to identify effective and defensible decision process elements for its assigned decision problem class. Each group is expected to document key observations and present (15 minutes) its findings and actionable recommendations at the end the breakout group session. Points to consider include:

1. Canonical descriptions of the decision type with DHS-specific examples
2. Methods for generating and characterizing alternatives
3. Determining how well objectives are met; metrics to assist in this process
4. Major uncertainties that complicate the decisions and how they could be addressed in the decision process
5. Structural and organizational features that might improve decision processes
6. How to involve stakeholders in decision processes and communicate and justify decisions to them

Charge to breakout groups

1. **What are the major obstacles to effective decision-making?**
2. **What is your vision of a high quality process?**
3. **What are the next steps (near-term and long-term)?**

BREAK OUT GROUP ASSIGNMENTS

Group 1 - Portfolio Management **Leader**: Dan Owen **Scribe**: Judy Kammeraad Cam Boulet Jerry Bracken Joe Kielman Jeanne Lin Bob Soule John Vitko	**Group 2 – Grant Allocation** **Leader**: Jim Dyer **Scribe**: Jean Savy Brian Cowan Darrell Darnell Holly Dockery Tom Edmunds Clyde Layne
Group 3 – Critical One-Time Policy Decisions **Leader**: Richard Danzig **Scribe**: Larry Brandt Jon A. Batt Amanda Dory Baruch Fischhoff Charles McLean Michael Nacht Bert Coursey **John Cummings** **Steve Sharro**	**Group 4 – Real-time Operational Decisions** **Leader**: Warner North **Scribe**: Tommy Woodall Dave Weinberg Susan Smith Glenn Coplon Jim Peerenboom Greg Suski John Darby Ed Smith Al Gina
Group 5 – SAFETY Act **Leader**: Scott Arnold **Scribe**: Susan Howarth Bob Anthony David Miller Bob Sims Scott Tousley Heidi Richenbach	

Appendix B – DHS and Case Study Presentations

DHS Presentations:

- Clyde Layne – Information Analysis and Infrastructure Protection Directorate
- John Vitko – S&T Directorate, Chemical and Biological Countermeasures Portfolio
- John Cummings – S&T Directorate, Critical Infrastructure Protection Portfolio
- Holly Dockery – S&T Directorate, SAFETY Act
- Holly Dockery – DHS Overview
-

Case Study Presentations:

- Cam Boulet – CRTI Consolidated Risk Assessment
- Daniel Owen – Best Practice Portfolio Management
- David Miller – Managing Terrorism Risk: An Insurance Industry Perspective

NOTE: Presentations are not included in this PDF file, but will be available on the DHS Workshop CD-ROM. To request a CD, please contact Mona Aragon via email (mlrage@sandia.gov).

Appendix C – Workshop Breakout Group Discussion Summaries and Presentations

Breakout Group Discussion Summaries
Breakout Group Presentations

Breakout Group #1 Discussion
Portfolio Management
Summary of Findings

Charter: The breakout group on Portfolio Management was asked to consider the problem scope and management challenges articulated by the DHS S&T portfolio managers, to suggest an ideal framework for portfolio management and to recommend next steps towards implementation of an ideal framework.

Process: The group reviewed and discussed the presentations given by the S&T portfolio managers the previous day and discussed their experiences with similar management challenges. They developed recommendations based upon their assessment of DHS needs and their knowledge of effective management practices employed at other organizations. The group included several DHS S&T portfolio managers, a Canadian researcher who had developed and implemented a risk-based portfolio management process for the Canadian government, and a DoD consultant experienced in implementing management process for that agency.

Major obstacles to effective decision making: The group perceived a need for a more coherent strategy across the three DHS S&T portfolio areas represented at the workshop: radiological/nuclear, chemical/biological, and critical infrastructure protection. In particular, technologies that could protect against multiple types of threats were not adequately accounted for and valued in the current decision making process. Opportunities for synergy among R&D opportunities in different portfolio areas were not adequately explored. This observation applies in general across all of the portfolios in S&T.

In addition, there are opportunities for improved vertical integration of portfolio management processes. The linkage between high-level S&T goals and allocation of budget to projects in each of the three portfolio areas could be more clearly defined. Metrics are needed to help determine the degree to which decisions in each of the portfolio areas contribute to achieving the overall goal.

What constitutes a high quality portfolio management process? The members of the group identified three key goals of a high quality decision process:

- Vertically integrated decisions so that high level goals are clearly communicated to all decision makers and the opportunities for tactical decisions are characterized and communicated to higher level decision makers (two-way vertical communication)
- Horizontally coherent strategies in which synergies across portfolio areas are recognized and evaluated
- Robust management strategies in the face of evolving threats, vulnerabilities and technology availability

Aspects of organizational culture and structure can facilitate implementation of effective decision processes. Some key factors include:

- Clarity about roles and responsibilities
- Real alternatives that are consistently evaluated
- Collaboration, communication and cooperation among stakeholders in the process

- Availability of high quality, unfiltered information (the DoD Program Analysis and Evaluation process was held out as a model to emulate)

A decision process the effectively incorporates all of these features will lead to a more robust portfolio that can accommodate uncertainties inherent in the DHS mission. Moreover, the process would provide a mechanism for performance measurement and feedback to the decision process to facilitate continuing improvement.

What are the next steps? The group developed three recommendations to move towards this ideal decision process. They are:

- Establish an Inter-directorate/ Inter-agency group to define a manageable number of scenarios to begin the formulation of strategy – The scenarios should reflect consistent and comprehensive treatment of uncertainties across the S&T portfolio and should take into consideration evolving threats.
- Establish a structured process within PPB for development of a coherent S&T portfolio strategy across all portfolio areas that is consistent with DHS policies and mission.
- Establish a process at the Under Secretary level for an integrated program definition and strategy development across the entire DHS/S&T enterprise. Such a process should include perspectives from PPB, ORD, HSARPA and SED in order to achieve a unified overall strategy.

Breakout Group #2 Discussion
Grant Allocation
Summary Of Findings

Charter: The breakout group on Grant Allocation was asked to review the nature and evaluate the methods of allocation of grants currently available from DHS. The group was asked to identify, within the context of grant allocation, major obstacles and impediments that impact high level decisions of the DHS, and to characterize critical elements of a high quality allocation process. The group was then asked to suggest actionable, near-term as well as long-term steps that could be implemented to improve on the present process.

Process: As a background buildup, the Grant Allocation Group identified the various classes of grant recipients and the major sources of funding available from DHS. The methods of grant allocation known to members of the group were also discussed and evaluated. Discussion of the main three questions in the charter of the group followed.

Background: As the DHS is composed of a number of departments that emphasize different aspects of safety and security in the face of catastrophic emergencies, there are multiple grant programs, each with its own allocation rules, and with different, but possibly overlapping, user bases. For FY2003, ODP grant programs included:

- Urban Areas Security Initiative Grant Program I – allocated $96M directly to seven urban areas
- Urban Areas Security Initiative Grant Program II – allocated $500M to twenty states with requirements that at least 80% of the funds be passed through to designated urban areas
- State Homeland Security Grant Program II – allocated $1.5B to fifty six states and U.S. territories

The first two grant programs require an assessment and strategy validation that includes identification of potential threat elements and vulnerable targets as well as current capabilities and needs assessments. The third program provides a list of allowable equipment and training expenditures.

For FY2004 and beyond, some of the programs mentioned in the discussion were:

- ODP grants to states and cities ($4B)
- FEMA fire grants ($750M)
- FEMA consequence mitigation grants ($250M)
- Formula grants, that are intended to enhance existing capability ($125M)

The recipients of these multiple grants can be the states, as well as the cities, including the city fire departments.

There seem to be three major classes of methods for allocating grants.

- The formula grants allocations are determined by a number of parameters that reflect needs, including the size of the population, value of assets at risk, and the severity of the threat (sometimes using a threat index).
- Competitive grants are based on proposals in response to established priorities. In this case, consideration of the general needs of the country are used as a basis for establishing the

priorities. Some forms of review, scoring, and peer-review of the process are then used to allocate the grants.
- Ad-hoc process not necessarily based on established rationale, but in response to crises, and sometimes coincidence of events, such as sudden availability and short life duration of funds.

Major obstacles to effective decision-making: Effective decision-making is a process in which the various stakeholders understand the process, its limitations and strengths, and agree on the outcome decision as satisfactory, even if this means give-and-take on their part. Any event or situation that blurs the process, increases its limitations, or increases the ambiguity in the purpose for the decision is seen as an obstacle to effective decision-making.

A key obstacle is the general fragmentation of the process. Grant funds originate in Congress and grants generally flow from DHS to the recipient cities, fire departments, etc, through the states that sometimes have different interests than the recipients. The allocation decisions made by Congress are generally not based on rigorous assessments of threat, vulnerability and risk, so it is unlikely that grants are optimally targeted on the highest priority security needs.

Lack of coordination between departments, and/or other agencies, can lead to program overlap that creates duplication and confusion as to the real needs and capabilities. In addition, this does not give any incentive for identifying and taking advantage of synergies between programs. Finally, it was noted that the lack of detailed and reliable information on the nature and characteristics of the threats does not allow for rigorous or even the simplest of risk analysis, thus depriving the decision makers of one of the most important tools at their disposal.

What constitutes a high quality grant allocation process? : The members of the group recognized that it would be difficult, if not impossible, to correctly integrate all the social and political elements with the underlying analysis and result in some kind of equation to determine grant allocation. As mentioned earlier, the social and political elements sometimes govern the decisions, in manners that can appear contrary to the results of a rational normative approach. Whatever the final process actual happens to be, a rational risk-based or even ad-hoc process, it was felt that it is important that it possesses several fundamental characteristics, as follows:
- It must have input from the end-users
- It must be transparent, easily understandable, and accepted by all the stakeholders
- Recognized by Congress
- Consistent with legislation and funding cycles
- It should identify the cross-cutting influences and needs
- It should establish and communicate priorities.
- It should be reviewed with the help of experts, and
- It should be based on objective criteria (such as population density, asset value, etc, as in the case of formula grants).

The group discussed the FEMA fire grants program and concluded that it is a high quality decision process, and is a good model to emulate in other programs. The method of allocation possesses the following characteristics:
- It uses the “market” to allocate competitive grants
- FEMA sets the priorities

- Peer reviews of the proposals are performed
- It emphasizes financial needs and project planning, and is based on a cost/benefit analysis.

What are the next steps? From the items discussed in the previous sections, it was found that the biggest improvements in the grant allocation process would be obtained with better coordination between the various organizations and with increased end-user participation in the process. A set of recommendations was presented in the previous section as a set to achieve high quality decisions.

In terms of strategy, the group recommended that a gradual approach be considered for creating synergies across grant programs, rather than implementing immediate structural changes. This might be achieved, for example, with initiatives that bring together multi-level (community, city, county, state) organizations. One example of such an initiative is project IMPACT, supported by FEMA, which could provide useful input in designing the grant process.

The group discussed several concrete recommendations as follows:

- Evaluate the applicability of the FEMA Fire Grants program to other programs: The process (see previous section for a brief discussion) was found to be high quality and could serve as a model for some grant allocations.
- Decentralize the distribution of funds by creating a Homeland Security Coordinator for each state (or small groups of states). This would allow the DHS, through its coordinators, to have direct interaction with the cities and communities, without a detour through the states' systems, implying better coordination and efficiency.
- Organize a workshop on grants programs to bring in DHS granting organizations with some representation from the recipients. Follow-up with a series of workshops specifically for the benefit of recipients.

Breakout Group #3 Discussion
Critical One-Time Policy Decisions
Summary of Findings

Charter: The breakout group on Critical One-time Policy Decisions (hereafter called the "Policy Group") was asked to review the challenges and impediments that impact high level decisions of the DHS S&T directorate and to characterize critical elements of a high quality decision process. The group was then asked to suggest actionable, near-term changes that would improve S&T decision processes.

Process: The policy group began by identifying several recent or pending national decisions in which S&T had or will have a role. These exemplary cases were discussed to identify factors, which could compromise the quality of the decision process. The principal areas, which were discussed, included:

1. The decision to deploy a national environmental biological surveillance system (Bio-Watch).
2. DHS efforts to prescribe radiation cleanup standards applicable to areas in which an RDD has been detonated
3. Initiation of an National ID Card program

Incidental observations relating to other programs also came forward in the process. A series of issues and concerns were identified, many of which applied to all of the exemplary decisions under consideration. Several of these concerns are identified in the following section. Finally, a number of steps that might address these concerns were suggested and are discussed in detail below.

Decision Impediments: As with all major policy issues having significant political factors, the DHS decision examples highlighted a number of shortcomings. These may, in fact, be accentuated by unique factors surrounding the new department. These include the diversity of organizational cultures drawn into the department, uncertainty regarding the threat and effectiveness of various national responses, and a deeply divided citizenry with little shared vision on homeland security issues. Some of the more specific issues discussed include:

1. Pragmatic solutions that involve risks and compromises remain politically unpopular. Individuals who are affected by potential security measures push back against new security measures through deeply engaged interest groups. Ideological positions often dominate the debate. Special interest groups often use analysis only to support their own positions.
2. Facing such division, national leaders have often demonstrated lack of political will. Expedient decisions that address political urgencies rather than considered solutions may result. These may include partial decisions that address the immediate problems rather than comprehensive, balanced plans. They may also involve solutions that reduce the impact and risks on politically active groups. For example, one reason that the decontamination criteria and future protective features in the postal sorting centers impacted by the 2001 anthrax letters are so demanding is the effectiveness of the postal workers union. In the absence of longer term planning and preparation, such immediate political pressures can result in skewed program directions.
3. National leaders may be misled by erroneous beliefs regarding public perceptions – and especially about the population's ability to understand and willingness to take considered risks. While political leaders tend to push toward minimizing risks in areas that are most

politically sensitive, a more comprehensive approach that informs the public on the risks and budget tradeoffs might be more effective and at least as politically palatable.

4. Homeland security decisions are often driven by bureaucracies and single-issue organizations, and not by problem-focused groups. Priorities are often set by legislative mandates. Many decisions are influenced by several agencies, each having partial jurisdiction. DHS itself is so new that many in the organization are not clear about its own internal decision processes. One good example of an organizationally driven process has been the effort to develop an interagency position on the cleanup standards for areas subjected to RDD attack.
5. The DHS S&T organization has not yet been able to prepare for urgent political crises with appropriate expertise, background technical information, and contingency plans for surge capability and effective user engagement. One recent example has been the operational and user issues associated with the national implementation of the Bio-Watch system.

Recommendations for Action: Based on the observations gleaned from the examples and from prior experience and thinking of the Policy Group members, a series of recommendations were formulated that take the first steps in addressing the issues outlined above. These are targeted primarily at S&T programs although many have much broader applicability across the department. Each is discussed individually below.

1. **Development processes must focus on end users, ensuring cradle-to-grave understanding of programs from the start.** It appears that many, if not most, S&T programs have not deeply engaged the user community. An overall perspective that considers manufacturability, supplier development, match with user operational needs, O&M requirements, and life-cycle cost is often not present, even when technical systems are mandated for national implementation. Issues associated with the widespread use of airport baggage screening systems and the Bio-Watch system are two examples. An increased emphasis on cradle-to-grave, user-focused concerns is essential to enable the widespread application of S&T systems.
2. **Contingency plans for accelerating program implementation should be developed.** Political urgencies (such as those that swept the Bio-Watch program onto the national stage) can propel programs forward so rapidly that consideration of operational user concerns, surge capabilities, and other life-cycle issues cannot be adequately addressed concurrently. Prior contingency planning for programs near or beginning deployment should be conducted.
3. **S&T should organize in a matrix pattern, on a sustained basis, to focus on major problems.** Large-scale attacks on the US homeland (e.g., a coordinated biological attack) will stress many aspects of our defensive and infrastructure systems. Preparation for response to such events must engage numerous S&T programs working in an effective matrix structure. Even the best technology programs, if stove piped in isolated bureaucracies, will not be able to significantly improve US preparedness. Program leaders from different S&T organizations must work together effectively to achieve real progress on the homeland security mission.
4. **S&T should establish crisis response teams.** These would be teams of experts, outside the chain of command, familiar with one another and practiced in task, to be on call as needed. Operational crises often require abandonment of cumbersome interagency processes in favor of existing, trusted teams of experts who can advise decision makers on rapidly breaking events. Such ad hoc teams must be organized and exercised prior to a crisis event in order to

function effectively when the unexpected occurs. They must be multi-disciplinary in nature, but are most effective when targeted toward related types of crises. A logical breakdown of several initial advisory groups could be along the lines of the major types of WMD events (i.e., biological, chemical, rad/nuc) that the nation might see over the coming years. The policy breakout group has even suggested names and acronyms for these initial groups: BEAT (Biological Emergency Advisory Team), NEAT (Nuclear Emergency Advisory Team), and ChEAT (Chemical Emergency Advisory Team).

5. **S&T should establish a political advisory group.** The political, public opinion, risk perception, and other non-technical factors influencing S&T policy decisions are both complex and important. S&T needs to develop an advisory group that can address these factors and provide timely input to one-time, high-level decisions facing DHS policy makers.
6. **S&T should routinely bolster the credibility of its work by employing eminent expert review processes.** For program and policy decisions that are not time urgent, S&T should increase the use of recognized, external panels or commissions to examine issues of concern from an independent perspective. In creating the structure of a broad new program addressing a compelling national mission, such input can identify alternatives and compelling rationale that is unlikely to appear from even an efficiently run government program. While such reviews will not always provide innovative perspectives, they are often of political value even if they validate existing program directions.
7. **S&T should complement many projects with public opinion research.** A clear understanding of public perceptions and informed public responses to policy alternatives is vital to the improvement of homeland security. A real understanding of public preferences surrounding the impacts of various security measures will free decision makers from the need to seek narrow, low risk solutions that respond to focused interest groups. Such understanding will also allow more credible communication of the rationale associated with the programs that S&T is pursuing. The acquisition of this type of information needs to be done by well-controlled means to avoid the perception that program leadership rests primarily on polling. However, the payoffs to this activity are very large due to the significant impacts on the population of many S&T initiatives. The citizenry of the US, when skillfully queried, can provide important insights regarding their preferences for alternative security options.
8. **S&T should routinely employ pilot programs and demonstrations.** This point extends the discussion included in recommendation #1 above. One very effective approach for understanding user needs, the impact of new systems on user operations, and other issues in the "cradle-to-grave" design of systems is to pilot these systems in real application environments. Such pilots can often test technologies in populations that are better controlled and for whom the benefits of the technology are clear. For example, national ID cards with biometric capabilities might be first employed as a positive air traveler ID to reduce airport screening delays.
9. **S&T should promulgate best practices in decision-making (e.g., mobilizing requisite set of experts; covering all relevant topics; and identifying the full set of health, security, and economic outcomes).** This summary statement reiterates the need for excellence in decision making within S&T.
10. **S&T should continuously reassess threats, including red teaming for emerging threats.** A key problem in the development of a cogent, rational S&T program is definition of processes for handling the wide range of current and emerging threats to the US homeland.

A core set of initial scenarios in the biological arena has been defined to serve as foci for the consideration of one portion of the S&T program. A team to continuously examine the evidence that would justify extension of this limited set is required. Furthermore, processes internal to S&T must review variants and nuances on the core set of threats to insure that systems under development are robust to unknowable details of the threat. Such red teaming is vital to insure confidence in security systems given the broad range of alternatives available to the attacker. A disciplined threat process is particularly important considering the new national security charter facing many of the organizations and functions that comprise the DHS.

Breakout Group #4 Discussion
Real-Time Operational Decisions
Summary of Findings

Charter: The Real-time Operational Decisions Breakout group was tasked to explore the potential utility of incorporating security risk-based decision support and analysis tools into the operational decision making cycle.

Process/Results: The Real-time Operational Decisions Breakout group began by discussing the breadth and complexity of DHS's mission space. The essence of this breadth and depth is seen in the DHS mission to protect and defend US citizens without intruding on their liberties. Following these discussions, the group discussed challenges related to operational mission execution. The challenges are numerous: complex mission space, overwhelming quantities and inconsistent data, data does not match context (pre-, during, and post-event), lack of understanding within DHS relative to roles and responsibilities, merging of cultures, language and definitions/terminology (e.g., different meanings of: removal, apprehension, detention, …), lack of clearances, lack of understanding of the big picture, no spanning response scenarios/playbooks, …

Following these context-setting discussions, the group developed a vision of an ideal decision support environment: Implemented and exercised "plays" with allowance for initiative – well-organized and trained team. A list of attributes necessary to implement such a system was also developed: includes relevant stakeholders, roles and responsibilities are clear and well-defined, clear/credible (not too many buttons on the remote), transparent, implemented in training (playbooks/ scenarios), and has appropriate timeliness.

Next, the group developed a set of near- and long-term steps required to transition to a security risk-based approach to decision-making. The near-term plan involves integrating analysts into problem owners' space to understand spectrum of needs – scope the problem, initiating cross-training to foster understanding across "stove-pipes," and mapping processes to be sure all relevant stakeholders are included, with "mature agencies" in lead. The longer-term plan involves deploying pilot tools, developing and validating "living playbooks" (includes demonstration of how to incorporate lessons learned) to drive training and responses, and developing and refining classes of decisions that need to be addressed in the relevant contexts of pre-event prevention/protection, real-time response, and post-event mitigation and restoration.

Finally, the group developed an initial set of decision classes to start the process of incorporating decision support tools. This set of questions includes:

- Priorities – What are they and how are they set?
- What operational system(s) is (are) in place?
- How do we prepare to fight?
- What are appropriate spanning scenarios? How are scenarios vetted?
- How do we capture lessons learned (after action)?
- Was an event accidental/natural or an attack? What would we do differently?
- How do we accomplish attribution?
- How much information is appropriate to share with public?

- How can we make decisions with inherently incomplete data without "crying wolf?"
- How do we identify good "war games" and exercises?
- How do we decide when "all clear?"
- How do we deal with vulnerabilities that we do not want to write down?
- What is the "small" set of targets where risk substitution does not apply?
- How do we collaborate/elicit knowledge?

Breakout Group #5 Discussion
Safety Act Decisions
Summary Of Findings

Charter: The SAFETY Act Breakout group was asked to review the challenges and impediments that impact high level decisions and to characterize critical elements of a high quality decision process within the context of the SAFETY Act. The group was then asked to suggest actionable, near-term changes that would improve SAFETY Act decision processes. Unlike the other four breakout groups, this group was concerned with addressing the more near-term, tactical issues related to implementing the SAFETY Act.

Process: The SAFETY Act Breakout group began by discussing the history, status and two primary goals of the SAFETY Act: 1) foster anti-terrorism technologies that save lives, and 2) ensure that the threat of third-party liability does not deter development and commissioning of qualified technologies. Following those discussions, the group brainstormed DHS challenges related to the Act. The challenges could be grouped into three areas: implementation, stakeholder satisfaction, and resource constraints. Implementation-related issues include the need for rapid implementation, the need to ensure effective implementation, and the need to develop metrics. Stakeholder satisfaction issues focused on pleasing "an unforgiving audience" that may include Congress, trial lawyers, and the public. Implementing these issues is further complicated by newness of DHS and limited understanding of the commercial operating envelope (legal, insurance, and commercial). Group members tasked with implementing the SAFETY Act strongly emphasized the need to better communicate the goals, relevancy and objectives of the Act to stakeholders.

The group spent some time discussing near-term SAFETY Act related questions focused on applications that had been submitted or that were expected. Examples of the sort of questions included:

1. Is the application complete?
2. Does the ATT meet the 7 criteria established in the act for designation and what metrics should be used to determine whether the 7 criteria are met?
3. Does the ATT meet the 3 additional criteria for certification and what metrics should be used to determine whether the 3 additional criteria are met?
4. How should sellers' liability limits be set?
5. How should constraints (contours) be established?
6. Does the annual seller report meet the criteria (and what are the metrics) for the amount of insurance coverage, the scope of insurance coverage, and reciprocal waiver of claims?

Once the group achieved a common understanding about the SAFETY Act goals and near-term issues, members discussed the three questions posed by the Workshop:

1. What are the major obstacles to effective decision-making?
2. What is the vision for a High Quality Process?
3. What are the next steps (near-term and long-term)?

Decision Impediments: The SAFTEY Act Breakout group identified five major obstacles to effective decision making. Three of the obstacles, lack of prior experience (i.e., lack of

precedents for criteria), lack of support mechanism, and lack of detailed criteria/basis for decisions, can be directly attributed to the newness of the DHS and SAFETY Act. The fourth impediment was described as the need to improve the communications system for the Act so that applicants and customers could better understand the objectives, constraints, and relevancy of the SAFETY Act. Finally, resource constraints was listed as the fifth impediment

High Quality Process Vision: The SAFETY Act group envisioned a High Quality Process that includes the following components:

1. Widely-publicized, detailed rules exist for each decision that are consistent, repeatable, validated and broadly accepted;
2. Flexible process in which rules could be used as guidelines;
3. Communication system (with feedback loop) exists for use internally by DHS as well as customers and the public; and
4. Process includes a strategic evaluation to assess whether the Act's (and Congress') goals and the DHS's objectives are met.

The SAFETY Act Breakout group also envisioned that adequate resources would be available to implement this vision.

Recommendations for Action: The SAFETY Act Breakout Group formulated near- and long-term recommendations to address the issues outlined above.

Short-Term:

1. Develop a strong, formal communication strategy by enhancing "outreach" activities and strengthening "inreach" activities to internal and external stakeholders.
2. Develop detailed guidance on rules for the 7 criteria and other near-term decisions. This could be achieved by using internal and external expert panels and reviewing detailed rules with key stakeholders including potential applicants and the insurance industry.

Long-Term:

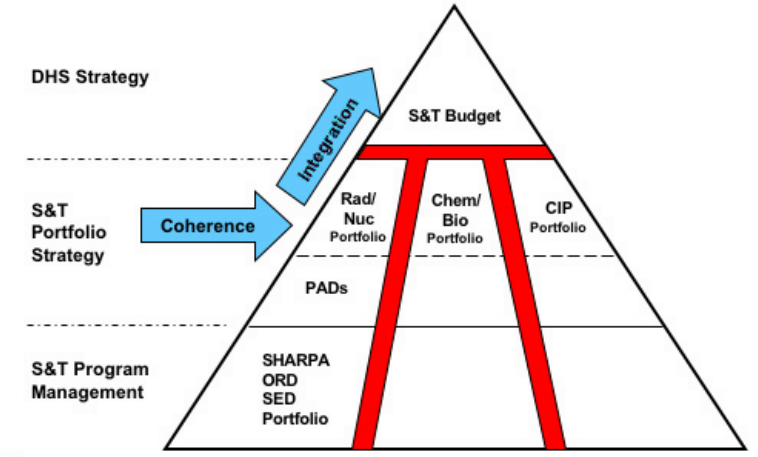
1. Develop a strategic plan to measure results and consider changes to the rule and SAFETY Act.

Breakout Group #1 Presentation Slides
Portfolio Management

Breakout Group #1
Portfolio Management Presentation

Leader: **Dan Owen**
Scribe: **Judy Kammeraad**
Cam Boulet
Jerry Bracken
Joe Kielman
Jeanne Lin
Bob Soule
John Vitko

We see gaps in the coherence and integration of the decision making processes used within DHS as a whole and within S&T



We see six elements that form the foundation of the workshop's mission

Development of consistent, defensible and valid decision making framework

- Vertically integrated
- Horizontally coherent
- Robust in terms if strategic challenges and changes

Clarity about roles and responsibilities	Real alternatives, honestly evaluated	Collaboration, communication and cooperation	High quality, unfiltered information (PA&E, DOT&E)
Accommodate the uncertainties inherent in DHS mission		Measurement and feedback to decision process	

Our recommended next steps in support of the mission statement of the workshop are:

1. **Establish and Inter-directorate/ Inter-agency group to define a manageable number of scenarios to begin the formulation of strategy**
   - Consistent and comprehensive treatment of uncertainties across the S&T portfolio
   - Must include evolving threats
2. **Establish a structured process for development of a coherent S&T portfolio strategy across Rad/Nuc, Chem/Bio and CIP**
   - Consistent with DHS policies and mission
   - Engage all portfolio managers ORD, and SED
3. **Establish a structured process for an integrated program definition and portfolio strategy within one S&T directorate**
   - Driven by the strategy
   - Engage program deliverers, formulators and users
   - Include generation and honest analysis of real alternatives

Breakout Group #2 Presentation Slides
Grant Allocation

Breakout Group #2
Grant Allocation Presentation

Leader: **Jim Dyer**
Scribe: **Jean Savy**
Brian Cowan
Darrell Darnell
Holly Dockery
Tom Edmunds
Clyde Layne

Grant Allocation Background

- **Multiple grants programs with different allocation rules and different user bases**
  - **ODP grants to states and cities ($4B)**
  - **FEMA fire grants ($750M)**
  - **FEMA consequence mitigation grants ($250M)**
  - **formula grants: enhance capability ($125M)**
- **Multiple grant recipients**
  - **states**
  - **cities**
  - **city fire departments**
- **Allocation mechanisms used today**
  - **formula grants (e.g., population, assets, threat index)**
  - **competitive grants (establish priorities, peer review applications and score)**

What are the major obstacles to effective decisions making?

- Congressional requirements not always risk based
- Fragmentation of decision processes
- Overlapping programs
- Lack of data on threat
- Synergies not recognized and captured across grant programs

What is your vision of a high-quality process?

- Establishes and communicates priorities
- Transparent process for evaluating alternatives
- Quality process that will be recognized by Congress
- In synch with legislation and funding cycles
- Ensuring the end users are strongly linked into process
- Need to identify the cross-cutting influences and needs

FEMA fire grants program is good model to emulate in other programs
- Uses the "market" to allocate competitive grants
- FEMA sets priorities
- Peer review of proposals
- financial need, cost/benefit, project plan


What are the next steps (near-term and long-term)?
Identify incremental steps for creating synergies across grant programs
Evaluate applicability of FEMA fire grants program to other programs
Workshop on grants programs that brings in DHS granting organizations (bring in grant recipients in later workshops)

Breakout Group #3 Presentation Slides
Critical One-Time Policy Decisions

Breakout Group #3
Critical One-Time Policy Decisions
Presentation

Leader: **Richard Danzig**
Scribe: **Larry Brandt**
Jon A. Batt
Amanda Dory
Baruch Fischhoff
Charles McLean
Michael Nacht
Bert Coursey
John Cummings
Steve Sharro

Recommendations (1 of 3)

1. **Development processes must focus on end users, ensuring cradle-to-grave understanding of programs from the start, including its incorporation in standards.**
2. **S&T should develop contingency plans for accelerating the evaluation and implementation of programs, in response to crises or political demands.**
3. **S&T should organize in a matrix pattern, on a sustained basis, to focus on major problems (e.g., bioattack).**

Recommendations (2 of 3)

4. S&T should establish teams of experts, outside the chain of command, familiar with one another and practiced in task, to be on call as needed. They could be called a BEAT (Biological Emergency Advisory Team), ChEAT (Chemical), NEAT (Nuclear).
5. S&T should establish a Policy Analysis Group of Experts (PAGE), to advise on political, public opinion, etc., aspects of S&T topics.
6. S&T should routinely bolster the credibility of its work by employing eminent expert review (e.g., NAS committees, commissions).

Recommendations (3 of 3)

7. S&T should complement many projects with public opinion research, including methods that consider informed public responses.
8. S&T should routinely use pilot programs and demos (with proper evaluation).
9. S&T should promulgate best practices in decision making (e.g., mobilizing requisite set of experts, covering all relevant topics; identifying the full set of relevant health, security, and economic outcomes).
10. S&T should continuously reassess threats, including red-teaming for emerging threats.

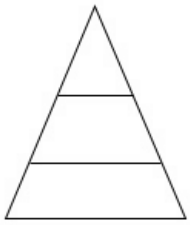
Breakout Group #4 Presentation Slides
Real-Time Operational Decisions

Breakout Group #4
Real-Time Operational Decisions
Presentation

Leader: **Warner North**
Scribe: **Tommy Woodall**
Dave Weinberg
Susan Smith
Glenn Coplon
Jim Peerenboom
Greg Suski
John Darby
Ed Smith
Al Gina
Jeanne Lin

Mission Space

- **Mission Space**
  - **establish justice**
  - **ensure domestic tranquility**
  - **provide for the common defense**
  - **promote the general welfare AND**
  - **secure the blessings of liberty**



- **DHS may be the only Cabinet Department with a mission that spans the whole government mission space. (Composed of Mature Agencies, but Infant Department)**

Question 1 - Obstacles

- **Obstacles – complex mission space, too much data, data does not match context (pre-, during, and post-event), don't understand DHS roles & responsibilities, merging of cultures, language & definitions (e.g., removal, apprehension, detention, …), clearances, not understanding big picture, connections, no spanning scenarios/playbooks, …**

Question 2 - Vision

- **Vision – Implement and exercise "plays" with allowance for initiative – well organized and trained team.**
- **Attributes of high quality process – include relevant stakeholders, well-defined roles & responsibilities, clear/credible (not too many buttons on the remote), transparent, implemented in training (playbooks/ scenarios), appropriate timeliness, …**

Question 3 – Next Steps

- Next steps
  - Near-term: integrate analysts into problem owners' space to understand spectrum of needs – scope the problem. Initiate cross-training to foster understanding across "stove-pipes." Map processes to be sure all relevant stakeholders included. Top-down, bottom-up and "mature agencies" in lead.
  - Long-term: After understand needs, deploy/pilot tools; develop & validate "living playbooks" (includes demonstration of incorporation of lessons learned) to drive training and responses,…

Questions

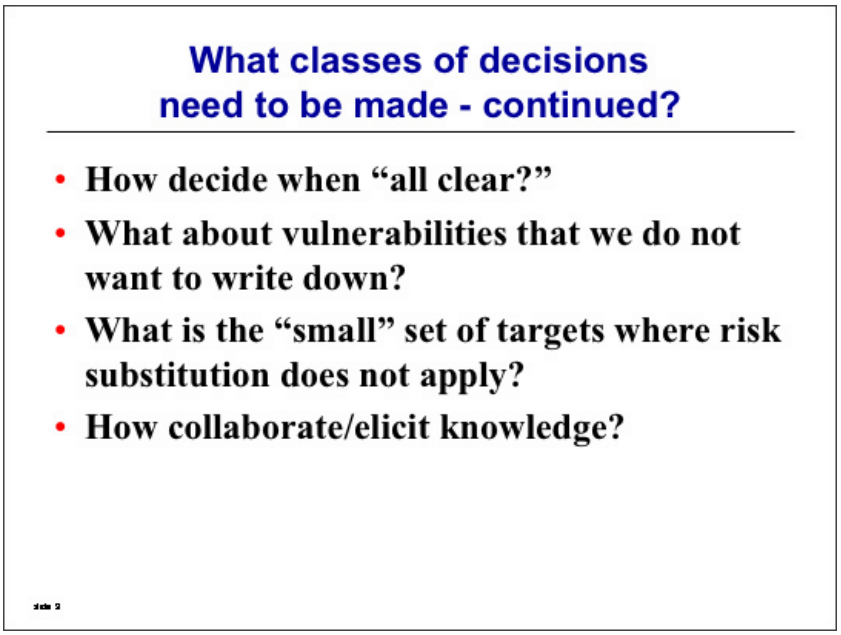
- What are the major obstacles to effective decision making?
  - Question 0 – How is DHS organized for operational decision making? Real-time prevention and post-event mitigation and restoration.
- What is your vision of a high quality process?
- What are the next steps (near-term and long-term)?

What classes of decisions need to be made?

- Priorities – How set?
- What operational system(s) is (are) in place?
- How do we prepare to fight?
- What are appropriate spanning scenarios? How vet scenarios?
- How capture lessons learned (after action)?

What classes of decisions need to be made - continued?

- Was this an accident/natural event or attack? What would we do differently?
- How accomplish attribution?
- What to share with public (Murphy's 3rd Law)?
- How make decisions with highly incomplete data (but can't cry wolf)?
- How identify good "war games?"


What classes of decisions need to be made - continued?
• How decide when "all clear?"
• What about vulnerabilities that we do not want to write down?
• What is the "small" set of targets where risk substitution does not apply?
• How collaborate/elicit knowledge?

Breakout Group #5 Presentation Slides
Decision-Making Process For Implementing The SAFETY Act

Breakout Group #5
Decision-Making Process for Implementing the SAFETY Act Presentation

Leader: **Scott Arnold**
Scribe: **Susan Howarth**
Bob Anthony
David Miller
Bob Sims
Scott Tousley
Heidi Richenbach

Goals (DHS to Confirm)

- **Foster anti-terrorism technologies that save lives.**
- **Ensure threat of third party liability does not deter development and commissioning of qualified technologies.**

DHS challenges with regard to the SAFETY Act

- Rapid implementation.
- Ensure implementation effectiveness
- Develop metrics
- Satisfy and unforgiving audience
  - Public
  - Trial lawyers
  - Congress
- Newness of DHS (lack of precedents)
- Resource availability
- Limited understanding of commercial operating envelope:
  - Legal
  - Insurance
  - Commercial

Major obstacles to effective decision making

- System for communications with regard to the SAFETY Act should be improved:
  - Congress
  - Applicants
  - Customers
- Lack of prior experience
  - No precedents for criteria
- Resource constraints
- Support mechanisms
- Detailed criteria/basis for decisions is not available.

Examples of decisions that must be made

- Is the application complete?
- Does the ATT meet the 7 criteria established in the act for designation?
- Set limit on the sellers liability.
- Establish constraints (contours).
- Does the ATT meet the 3 additional criteria for certification?
- Does the annual seller report meet the criteria for:
  - Amount of insurance coverage.
  - Scope of insurance coverage.
  - Reciprocal waiver of claims.
  - Other

Vision of a high quality process

- Detailed rules exist for each decision that are:
  - Consistent and repeatable
  - Validated and broadly accepted
  - Widely publicized
- Process is flexible (rules are guidelines)
- Feedback/communications system exists for DHS internally, applicants customers and the general public
- Process exists for strategic evaluation to determine:
  - If the goals of the law and Congress being met
  - If the law is supporting DHS objectives
- Resources are available to implement the vision.

Short term next steps

- Develop a strengthened, more formal communications strategy:
  - Enhance "outreach" activities
  - Strengthen "In-reach" activities
- Develop detailed guidance on rules for each of the 7 criteria and the other decisions that must be made.
  - Use internal and outside experts as appropriate.
  - Assemble panel of key stakeholders in some areas.
  - Review resulting detailed rules with key stakeholders:
    - Potential applicants
    - Experts
    - Other stakeholders such as the insurance industry.

Long term next steps

- Develop a strategic plan to measure results and to consider changes to the rules and the act.

Criteria for approval of applications

- **For Designation:**
  - Prior Government use or effective demonstration
  - Immediately Deployable.
  - Large liability to seller
  - Would not be deployed w/o safety act
  - Large risk exposure to public w/o approval
  - Review of all available studies.
  - Technology must be effective
- **In addition, for Certification:**
  - Technology performs as intended
  - Technology conforms to seller specifications
  - Technology is safe as used