Two Case Studies
in
Collaborative Public-Private Risk Assessment
in
Vessel Traffic Safety

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Two Case Studies

- The Ports and Waterways Safety Assessment Process (PAWSA)

- Offshore Vessel Routing Schemes along the California Coast and Monterey Bay National Marine Sanctuary

The Ports and Waterways Safety Assessment Process (PAWSA)

PAWSA Background

- EXXON VALDEZ oil spill
- Oil Pollution Act of 1990 (OPA ‘90)
- Assess need for VTS in “high volume oil ports”
- Port Needs Studies already in process
- Volpe Transportation Systems Center
- Classical probabilistic/OR approach
- Results widely rejected
  - Congress
  - Stakeholders
  - Internal Coast Guard

Criticisms of Volpe Port Needs Studies

- “Little stakeholder involvement”
- “Input data questionable and/or incomplete”
- “Focus on single solution to varied problems”
- “Not reflective of new technologies”
- “Inadequate attention to mariner needs”
- “Wrong answers”
- “Answers pre-determined”
- “Bloated federal program”

“The Rest of the Story”

- All Politics is Local
  - Every port in the nation is the **MOST UNIQUE** port in the nation
  - Every port in the nation is the **MOST IMPORTANT** port in the nation
- Clinton Administration User Fee Proposal
  - Broad industry opposition to any fee
  - Concerns over User Fee impact on port competitiveness
- VTS as port “status symbol”
  - “not important enough to rate a VTS”
  - “not safe because it has no VTS”
  - “so safe it doesn’t need a VTS”

National Dialogue Group Guidance

- Not every port needs a VTS
- VTS is only one of many available VTM tools
- Solution may not be a VTS
- Appropriate tools to be used in coordination
- Local users can provide best insight on risk drivers in a given port
- Issue isn't "Where do we build the next VTS?"
- Issue is " What is needed where, to mitigate identified risks?

Finding a Balance

- Stakeholder Needs
- Risk Drivers
  - Probability
  - Consequences
- Effectiveness
- Budget

Ports and Waterways Safety Assessments

- Vessel traffic risks
- National approach / broadly applicable
- Low cost / widely deployed
- Locally focused
- Expert & stakeholder involvement
- Select locally appropriate risk mitigation
- Structured analytical process

Key Features

- 2-Day Process Involving 10-30 Participants
- Local Expert Opinion
- Flexible and Easy to Use
- Systematic Evaluation
- Broad Risk Driver Coverage

PAWSA Methods & Techniques

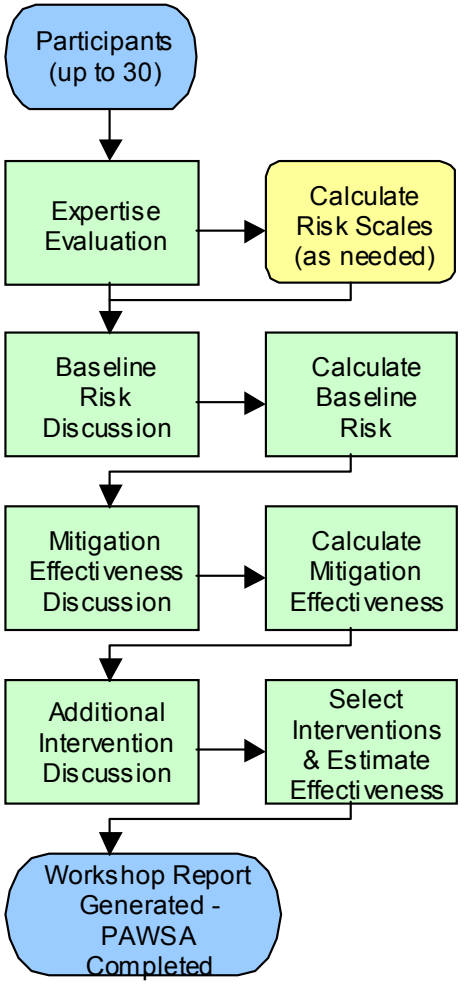
- Anchored Rating Scales
- Expert Opinion Solicitation
- Analytic Hierarchy Process
- Neutral Facilitators
- Structured Process and Product

Using Experts

- Requires Cross Section of Users, Planners, and Stakeholders
- Promotes Participant Buy-In of Results
- Answers Correlate with Known Quantitative Values
- Not Reliant on Available Data (i.e., user knowledge of “near misses” vs. CG data limited to actual accidents)

Systematic Process

- Steps Build on Each Other
  - Expertise Evaluation
  - Baseline Risk
  - Mitigation Effectiveness
  - Additional Interventions
- Transparent Calculations
- Results Traceable to Participant Input



Process Flowchart

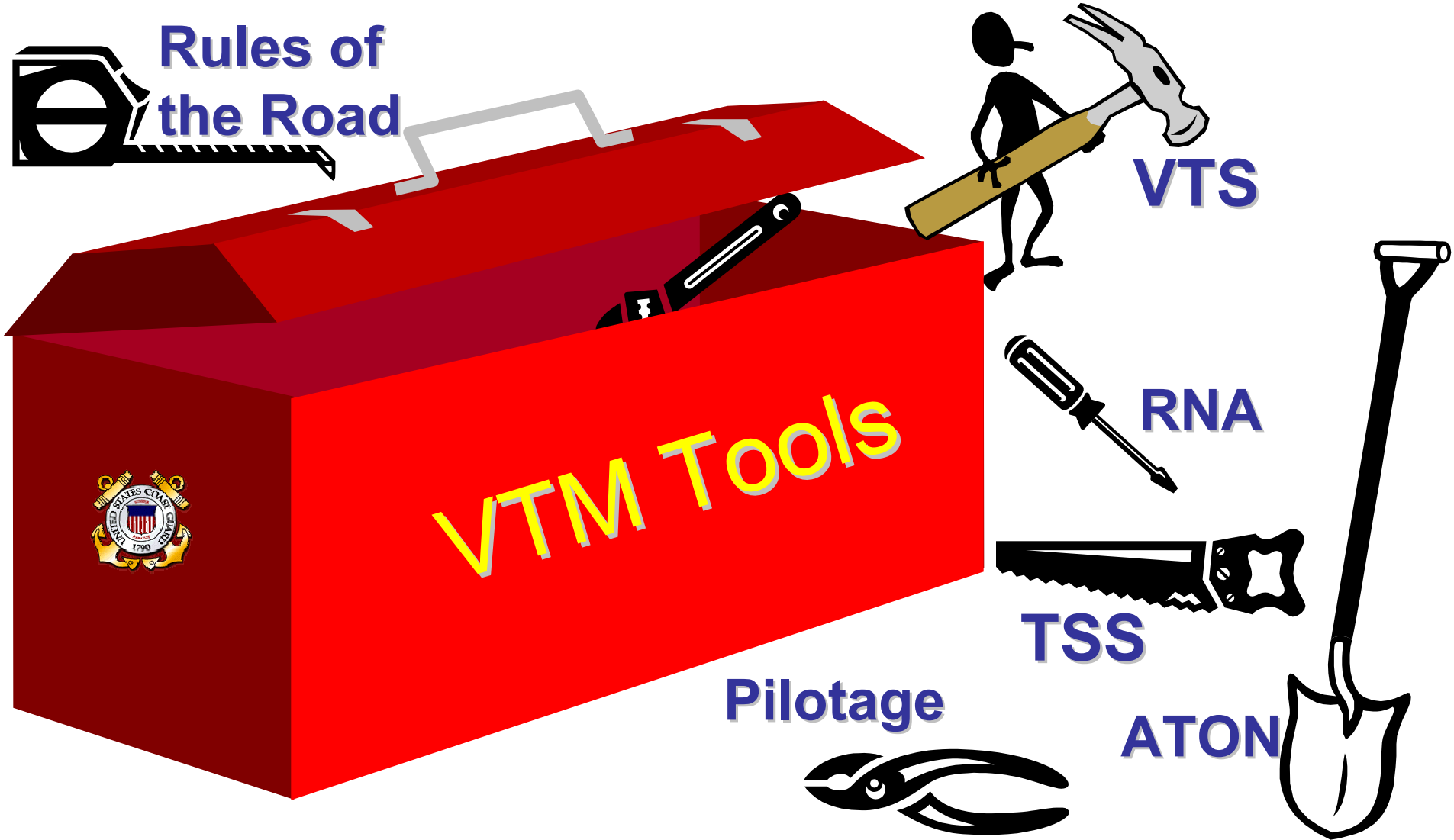
Risk Categories and Factors

Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences
Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personal Injuries	Health and Safety
Deep Draft Mariner Proficiency	Volume of Small Craft Traffic	Currents	Dimensions	Petroleum Discharge	Environmental
Shallow Draft Mariner Proficiency	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
Small Craft Operator Proficiency	Congestion	Obstructions	Configuration	Mobility	Economic

Output – Baseline Risk

Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences
Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personal Injuries	Health and Safety
4.5	1.9	4.5	1.0	5.7	3.0
Deep Draft Mariner Proficiency	Volume of Traditional Fishery Traffic	Currents	Dimensions	Petroleum Discharge	Environmental
5.5	3.4	7.9	5.3 *	9.0	9.0
Shallow Draft Mariner Proficiency	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Material Release	Aquatic Resources
7.0	3.3	3.2	8.5	6.5	7.2
Traditional Fisher Proficiency	Congestion	Obstructions	Configuration	Mobility	Economic
5.6	2.6	2.6	5.1	4.3	7.6

Vessel Traffic Management
- Tool Kit -



Output – Mitigation Effectiveness

Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences

Vessel Quality		Volume of Commercial Traffic		Winds		Visibility Impediments		Personal Injuries		Health and Safety	
4.5	3.9	1.9	2.2	4.5	3.6	1.0	1.0	5.7	5.3	3.0	3.1
NO		RISING		Balanced		Balanced		Maybe		RISING	
Deep Draft Mariner Proficiency		**Volume of Traditional Fishery Traffic**		**Currents**		**Dimensions**		**Petroleum Discharge**		**Environmental**	
5.5	4.5	3.4	3.4	7.9	6.2	5.3	5.5	9.0	7.3	9.0	7.9
NO		Balanced		Maybe		RISING		Maybe		Maybe	

KEY

Risk Factor	
Book 3	Book 4
Consensus	

Book 3	Absolute level of risk
Book 4	Level of risk taking into account existing mitigations
Balanced	Consensus that risks are well balanced by existing mitigations
Maybe	No consensus that risks are adequately balanced by existing mitigations
NO	Consensus that existing mitigations do NOT adequately balance risk
RISING	Existing mitigations or future projections are causing /will cause risk to rise

Output – Interventions

Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences
Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personal Injuries	Health and Safety
Enforcement	Rules & Procedures	Balanced	Balanced	Coordination / Planning	Coordination / Planning
1.9 Caution	1.0			3.3	0.9 Caution
Deep Draft Mariner Proficiency	Volume of Traditional Fishery Traffic	Currents	Dimensions	Petroleum Discharge	Environmental
Rules & Procedures	Balanced	Nav / Hydro Info	Rules & Procedures	Coordination / Planning	Coordination / Planning
2.7		2.5	2.9	3.3	2.8

KEY

Risk Factor
Intervention
Risk Improvement / Caution

Intervention
Risk Improvement
Caution

Intervention category which was judged most effective in further mitigating risk

Expected improvement in risk level if new mitigation measures were implemented

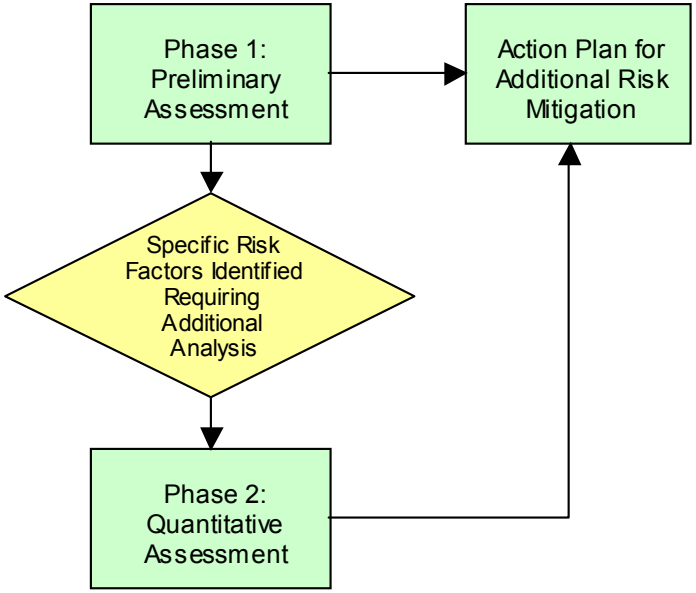
No consensus alert

PAWSA Results

- Assessment of current measures vs identified risks
- Projected effectiveness of alternatives
- Strategic Plan
  Identifies risk / Mitigation measure / Process owner
- Stakeholder buy-in
- Focuses future Harbor Safety Committee discussions / efforts
- Support for investment decisions

Moving Forward

- IALA* Generic Risk Model (GRM)
  - PAWSA (Phase 1)
  - IALA Waterway Risk Assessment Program (IWRAP) (Phase 2)
- Continued Refinement



Generic Port Risk Model Structure

*IALA – International Association of Marine Aids to Navigation and Lighthouse Authorities

California Coast & Monterey Bay National Marine Sanctuary

Offshore Vessel Routing Schemes

Background

- Extreme Environmental Sensitivities
- Grounding & Oil Spill Risk Perceived as High
- Previous Effort followed traditional Port Access Route Study & Public Rule-making Processes
- Traditional Processes Proved Inadequate
- Highly Polarized Positions
  - Industry Viewed as Irresponsible & Greedy
  - Environmental Advocates Viewed as Unreasonable & Irrational

Finding a Balance

- Stakeholder Needs
- Risk Drivers
  - Probability
  - Consequences
- Effectiveness
- Budget

Developing a Win-Win Solution

- Facilitated sessions in neutral setting

- Ground Rules
  - All legitimate stakeholders represented
  - Respect for others' concerns
  - Objective Evaluation of Concerns (i.e., based on Science & Engineering)
  - Decisions based on Fact, not Emotion

- Start with Outcome/End-State **ALL** Agreed On
  - **NO** Oil Spills
  - **NO** *Unnecessary* Costs Incurred by Industry

- Reverse Engineer from desired end-state via scenarios incompatible with desired end-state

Example Scenario

- Loss of Power
  - Ship drifting aground
  - Winds and Currents
- Feasibility
  - Historical Weather and Current Data
  - Drift characteristics of ships
- Interventions
  - Available Response Resources
  - Response Times vs. drift predictions
- Analysis – minor change to offshore routing schemes provides sufficient response times under worst case conditions

Outcome

- Changes recommended
  - Coastal “Recommended Routes” moved slightly further offshore
  - Traffic Separation Schemes in Santa Barbara Channel and San Francisco entrance adjusted
- Transit Time and Fuel Cost increases
  - Minimal
  - Readily Accepted by Industry
- US and International Regulatory Changes Easily Approved due to Stakeholder Support

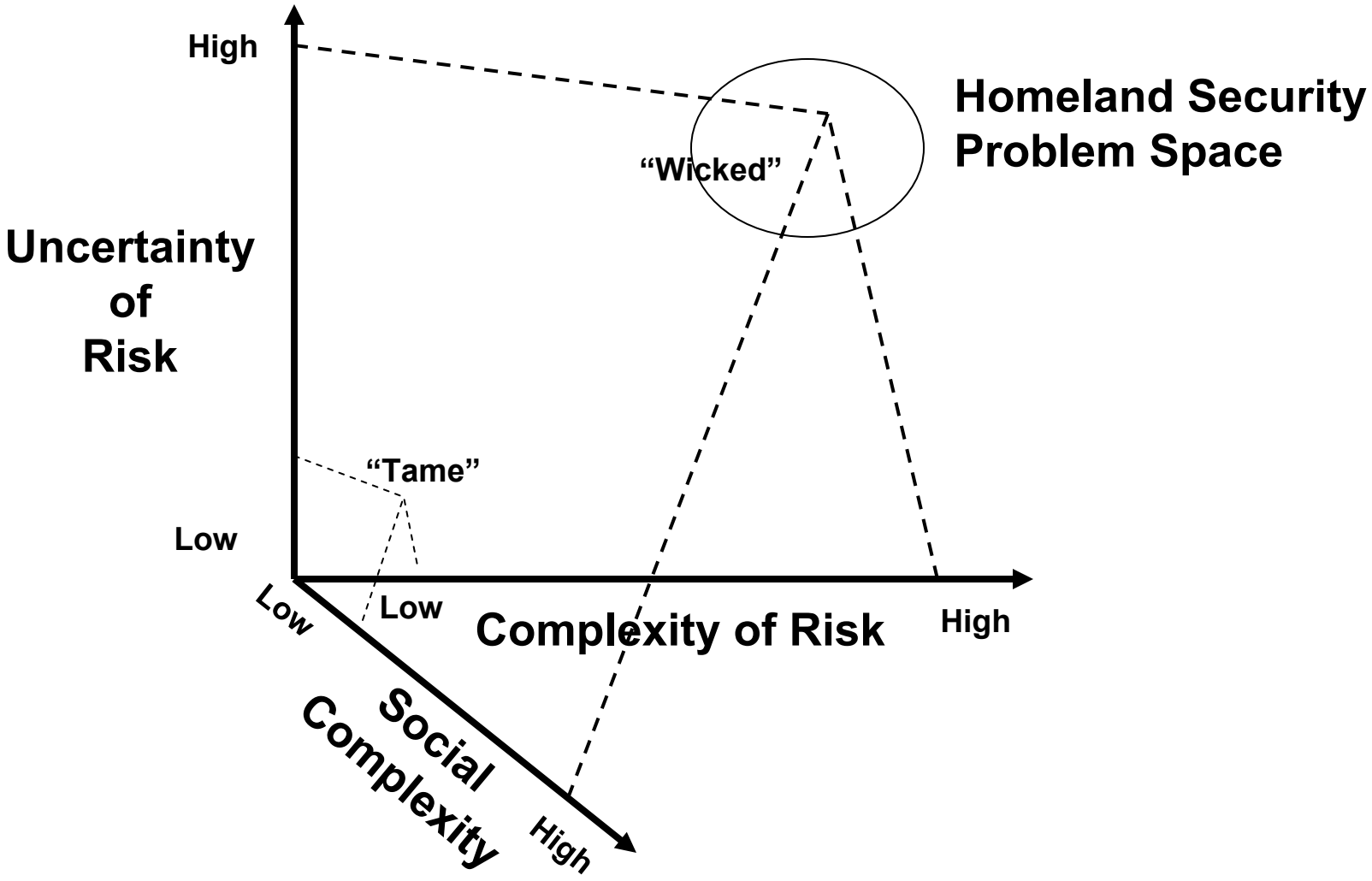
Lessons Learned

- **Include Stakeholders**
  - Legitimate stakeholders will fight if excluded
- **Respect** legitimacy of stakeholder concerns
  - Stakeholders will support decisions if meaningfully involved/heard in decision-making process
- Provide a **Structured & Transparent Process**
- **Neutral** facilitation and venue help
- Work backwards from an **Outcome** all parties agree to
- Identify **Risk Drivers** and appropriate **Interventions**
- Work from **Facts**, not Emotion
- **Experts** add immeasurably (but get the ***right*** experts)
- ***All of us*** is smarter than ***one of us***.

A Note of Caution

- Fundamental Differences - Security vs. Safety Risks
- Levels of Uncertainty
  - Vessel Traffic Safety
    - where? when? how? which vessel or vessels? how bad?
    - the *sine qua non* for vessel traffic safety is the vessel but vessels don't hide – if there is a vessel, there is a risk
  - Terrorism
    - where? when? how? which target or targets? how bad?
    - the *sine qua non* for terrorism is the terrorist and terrorists DO hide – if there is no terrorist visible is a terrorist even there?
- Nature of Risk Drivers
  - Safety Risks arise from normal daily life
  - Security Risks driven by actions of an adaptive, reactive and strategically-driven adversary

The Homeland Security Decision-Making Environment



Wicked Problems

- You don't understand the problem until you have developed a solution.
- Wicked problems have no stopping rule.
- Solutions to wicked problems are not right-or-wrong, but good-or-bad, better-or-worse.
- Every wicked problem is essentially unique and novel.
- Every solution to a wicked problem is a "one-shot" operation."
- Wicked problems have no given alternative solution
- Every wicked problem can be considered to be a symptom of another problem.
- Every solution to a wicked problem can generate more problems.

Questions?

http://www.navcen.uscg.gov/mwv/projects/pawsa/PAWSA_Back.htm