Ensuring Optimum Resilience in Marine Transportation: Extended Applications of the Maritime Security Risk Analysis Model & the Dynamic Risk Management Model

By:

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Ensuring Optimum Resilience in Marine Transportation: Extended Applications of the Maritime Security Risk Analysis Model & the Dynamic Risk Management Model

MSRAM (Maritime Security Risk Analysis Model):

“Because it is not feasible to secure our homeland against every conceivable threat, we have instituted risk management as the primary basis for policy and resource allocation decision making.”

-DHS Strategic Plan 2012-2016

Mission 1: Preventing Terrorism And Enhancing Security
Mission 2: Securing And Managing Our Borders
Mission 3: Enforcing And Administering Our Immigration Laws
Mission 4: Safeguarding And Securing Cyberspace
Mission 5: Ensuring Resilience To Disasters

Man Made Disasters

Natural Disasters

MSRAM DRMM

M. BURNS, TRB June 2014
AIM:

• Alleviate terrorist attacks within the USA;
• Reduce the Nation’s vulnerability to terrorism;
• Eliminate the resulting consequences, i.e. damages;
• Recuperate from potential threats / attacks, while ensuring socioeconomic security and sustainability;

• MSRAM is a security risk analysis tool used to assist in the prioritization and protection of Critical Infrastructure and Key Resources (CIKR).

• DRMM = Develop risk management for optimum decision making

• Critical Infrastructure Protection (CIP) Federal departments will identify, prioritize, coordinate protective measures through Shifting from a consequence based system to a risk based system.
MSRAM = Risk Assessment

DRMM = Develop risk management for optimum decision making:

• Security Vulnerabilities to anthropogenic disasters (*natural);
• Resource restrictions & sensible allocation;
• Infrastructure precedence;
• National priorities (socioeconomic);
• National planning scenarios, funding (local, state, national, tribal).
2. MSRAM Methodologies:
Achieving Risk Reduction; Alleviating Risks; Protective measures; Estimating Primary & Secondary Security Consequences.

MSRAM Risk Assessment per target / attack mode.
MSRAM data analysis enhances decision making throughout the chain of Command:

1. STRATEGIC LEVEL
2. TACTICAL LEVEL
3. OPERATIONAL LEVEL

1. Strategy
2. Risk Assessment, Alternatives.
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MSRAM RISK INFORMATION & SCENARIO ASSESSMENT

**Target Risk Data**
- **Target Name**
- **Area** (port, waterway, lat/long, county)
- **DHS MCI/KR Station** (Maritime Critical Infrastructure/Key Resource)
- **DHS Critical Port Infrastructure**
- **USCG Station**

- **Risk Assessment/Mitigation**
  - **USCG role** (lead, support, other)
  - Maritime Transportation Security Act (MTSA 2002) Equiv. to ISPS.
  - Port Captain

**Scenarios= Target & Attack Mode**
- **Threat**
  - Ideology Intent
  - Capability
  - Geographic Intent.

- **Vulnerability**
  - Feasibility
  - Target vulnerability
  - Max Consequence

**Consequences**
- **Primary consequences:**
  - Death/Injury
  - National Security
  - Symbolic
  - Economic, direct
  - Health & Environmental, direct

- **Secondary consequences**
  - Economic, indirect
  - Health & Environmental, indirect.
MSRAM & DRMM serve as “Risk Based Decision Making tools” for terrorism;

- Risk Assessment & Risk Management tool;
- Helps develop risk management & contingency plans;
- Prioritizes investment, helps develop risk reduction strategies;
- Helps carry out in depth risk assessment scenarios.
- Justifies risk management decisions at the tactical, operational and strategic levels.
The role of MSRAM (Maritime Security Risk Analysis Model):

**MSRAM architecture** facilitates contrast & comparison of targets.

**Aims** to reduce risk by prioritizing security resources, measures, and potential impact to over 28,000 maritime targets.

<table>
<thead>
<tr>
<th>TARGET TYPES</th>
<th>ATTACK MODES</th>
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<tbody>
<tr>
<td>• Targets in the vicinity of military outloads.</td>
<td>• Boat Attack</td>
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<tr>
<td>• Strategic assets: Nuclear power plants.</td>
<td>• Attack by hijacked aircraft</td>
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<tr>
<td>• Infrastructure (Bridges, pipelines, tunnels, dams).</td>
<td>• Attack by hijacked vessel.</td>
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<tr>
<td>• Offshore Platforms, MTSA-regulated facilities.</td>
<td>• Assault team / Suicide Attack</td>
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<tr>
<td>• HAZMAT Carriers, Barges and Ships.</td>
<td>• Sabotage</td>
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<tr>
<td>• High rise buildings and non-regulated high consequence targets in the port &amp; waterway vicinity.</td>
<td>• Bomb (Boat, Truck, Aircraft, Submarine).</td>
</tr>
<tr>
<td>• Historical buildings, monuments and events.</td>
<td>• Bomb (Swimmer/Diver)</td>
</tr>
<tr>
<td></td>
<td>• Mines (Aquatic and Land)</td>
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<td></td>
<td>• Chemical, Biological, Nuclear weapons.</td>
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<td></td>
<td>• Passenger ship / explosive devices.</td>
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*Source: USCG 2012*
Post - September 11, 2001:

- **Protect US potential targets** of attack: seaports, waterways, ships and refineries.

- **USCG (DHS)** federal agency for maritime security, encompassing the protection of U.S. ports, coasts, and inland waterways as part of its Ports, Waterways, and Coastal Security (PWCS) mission.

- **Economic impact**: cargoes of $700 billion / annum (DHS 2012).

- Impact on **global trade, transport, society**.
The role of MSRAM (Maritime Security Risk Analysis Model):

2004: USCG commitment to design & implement risk management & risk assessment.
- Progress in assessing maritime security risks using MSRAM.

2005: MSRAM development: the Coast Guard had begun to address the limitations of its previous port security risk model.

2012: USCG risk management is implemented through MSRAM:
- Prioritizing port security resource allocation;
- Recognizing competences essential to alleviate potential threats;
- Identifying key targets.
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<tbody>
<tr>
<td><strong>AIM</strong>: enhancing Captain of the Port (COTP) Risk security management. Improve =</td>
<td><strong>AIM</strong>: sustain field + headquarters. Addresses threat element from USCG Intelligence Coordination Center (ICC) + consistency issues. Supported=</td>
<td><strong>AIM</strong>: advance training, support &amp; information assessment. • Expanded range of scenarios. Supported=</td>
<td><strong>AIM</strong>: Address full scope of CBRN Threat) (Chemical, Biological, Radiological, And Nuclear Risk Assessments). Improve = consequence/vulnerability analysis. Address 18 of 18 CIKR (Critical Infrastructure and Key Resources). Support DHS, OGA, states and other nation’s risk analysis. GAO = Maritime security is the only are to receive the grade of substantial progress. (<em>GAO= government accountability office=</em> 3rd party validation after USCG.</td>
</tr>
<tr>
<td>• consistency + threat</td>
<td>• COTP/SECTORS Operation Neptune shield. Special training for port security teams.</td>
<td>• TWIC Card, transportation worker identification card.</td>
<td></td>
</tr>
<tr>
<td>• Consequence data to support ONS (Operation Neptune Shield).</td>
<td>• Operation Neptune shield.</td>
<td>• Combatting maritime terrorism.</td>
<td></td>
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<tr>
<td>• Port Risk data supported port security risk assessment. Government Accountability Office (GAO) = Good start – improvements needed.</td>
<td>• TWIC card.</td>
<td>• Mounted automatic weapon project.</td>
<td></td>
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<tr>
<td>GAO = Address concerns. Addresses 13 of 18, critical infrastructure and key resources.</td>
<td>• Fight maritime terrorism.</td>
<td>GAO = Most efficient tool for risk management in DHS.</td>
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</table>
The role of MSRAM (Maritime Security Risk Analysis Model): Supporting U.S. Coast Guard’s mission to forecast and alleviate “generic attack” security risks within U.S. ports and waterways. Evaluating threats, consequences and key vulnerability areas.
The role of DRMM (Dynamic Risk Management Model):
To utilize MSRAM’s risk assessment data and methodology in likely scenario-based drills that reflect likely threats and expose vulnerabilities. It accurately evaluates timelines, investment needs, and prioritizes risk.
Federal Emergency Management Agency


**PREVENTION**: prevent security threats within USA.

**PROTECTION**: reducing vulnerability to terrorism.

**MITIGATION**: Averting danger

**RESPONDING**: eliminating damage

**RECOVERING**: after attack, ensuring socio-economic security.

https://www.fema.gov/learn-about-presidential-policy-directive-8
DHS Strategic Plan, 2012-2016

VISION
A homeland that is safe, secure, and resilient against terrorism and other hazards.

MISSION
We will lead efforts to achieve a **safe, secure, and resilient homeland**. We will counter terrorism and enhance our security; secure and **manage our borders**; enforce and administer our **immigration laws**; protect cyber networks and critical infrastructure; and **ensure resilience from disasters**. We will accomplish these missions while providing essential support to national and economic security and maturing and strengthening both the Department of Homeland Security and the homeland security enterprise.
SECURITY THREATS:
NEW SCENARIOS AND APPLICATIONS

TERRORISM

SEA PIRACY

CYBERSECURITY

CLIMATE CHANGE

HURRICANES

FLOODING
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- SEA, LAND, AIR TRANSPORTATION
- ENERGY & INDUSTRY
- PUBLIC, PRIVATE AND COMMUNITIES

- HARMONIZE SECURITY POLICIES & PROTOCOLS
- FURTHER ALIGN PUBLIC & PRIVATE SECTOR
- RESOURCE INVESTMENT & MANAGEMENT

- COMMUNICATION
- EDUCATION
- CULTURE
- TECHNOLOGY

- RISK ASSESSMENT TOOL
- RISK MANAGEMENT TOOL
- RESOURCE ALLOCATION
- INVESTMENT OPTIMIZATION
- PUBLIC-PRIVATE SECTOR COALITION
- ACCURATE CONTINGENCY PLANS
Impact of a terrorist attack

Logistics companies lose US$3 - US$4 million a day while the ports are closed, while producers/manufacturers suffer disruptions to their assembly lines. ("just in time").

Supply chain financial loss due to terrorist attack threat
Half a Billion dollars per week per major port, e.g. LA, Long Beach
- supply chain: industrial & transportation disruptions.

9/11 terrorist attack losses:
3,000 lives + 60 billion: (direct + indirect losses)

Direct losses: (physical assets) $28 billion.
Indirect losses (insurance for loss of life, business collapses, jobs lost, infrastructure and other liabilities amount to $32 billion.)
The Socio-Economic Impact of a Natural Disaster:

Hurricane Katrina – NOLA, USG

August 2005

1,833 people died & Thousands in distress; USD 108 billion in damages

The Gulf of Mexico: destruction of rigs and refineries brought on by the hurricane, over 91% of oil production and 83% of gas production was shut down. 6 months after Katrina 85% of daily gas and 76% of daily oil production were restored.

Earthquake in Kobe, Japan,

January 2005

6,400 people died, 30,000 injured & Thousands in distress;

US$ 200 billion in damages
100,000 buildings destroyed
300,000 homeless
KOBE - Japan’s major port closed for 2 months;
20,000 Toyota cars – production off-schedule (NIST SP 901)
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MSRAM, DRMM & POLICIES

Policy
- General management statements

Standards
- Specific mandatory controls

Guidelines
- Recommendations/best practices

Procedures
- Step-by-step instructions

Compulsory programs
- High-security mechanical seal ISO 17712 standard (USA, WCO)

Sources:
WB 2014; ISO 2014
Supply Chain growth is directly proportional to Security risks.
Whereas targets shift to the six key components of a Supply Chain, i.e.
1) Production (Industrial Zone, Refineries),
2) Supply (key-components i.e. spare parts for value-added goods),
3) Mass Storage Areas (Warehouses, Distribution Centers)
4) Transportation (Hub Ports, Sea Ports, Airports),
5) Decision-Making Centers (Areas of Political, Economical and Military significance) and
6) Cyber Security (access to sensitive data via IT).

Source: M. Burns, JTRS 2013
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HIGH SECURITY RISK TENDS TO SHIFT TO AREAS OF GROWTH

POLITICAL, MILITARY, ECONOMIC CENTERS

PRODUCTION: industrial zone, refineries.

DISTRIBUTION CENTERS, Mass Storage Areas.

TRANSPORTATION

I.T.

GDP Density

GDP, Defense, Technology, Population
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HIGH SECURITY RISK TENDS TO SHIFT TO AREAS OF GROWTH

- **PRODUCTION**
  - industrial zone, refineries.

- **DISTRIBUTION**
  - CENTERS, Mass Storage Areas.

- **TRANSPORTATION**

- I.T.
Estimating the Economic Impact of Security
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Man-made and Natural Disasters

MSRAM & DRMM Focus

Threat
Vulnerability
Consequences

Plan Attack
Team formation
Attack Resources. Weapon testing.
Target surveillance.
Penetrating target defense
Weapon Detonation / Release
Primary Impacts
Secondary Impacts

Identify Vulnerabilities
Prevention & Planning
Protection
Response
Primary Consequence Mitigation
Resilience

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**MSRAM → Risk Assessment → Component of Risk Management.**

**DRMM → Risk Management = the big picture.**

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<th>Likelihood</th>
<th>Insignificant (Minor problem easily handled by normal day to day processes)</th>
<th>Minor (Some disruption possible, e.g. damage equal to $500k)</th>
<th>Moderate (Significant time/resources required, e.g. damage equal to $1 million)</th>
<th>Major (Operations severely damaged, e.g. damage equal to $10 million)</th>
<th>Catastrophic (Business survival is at risk damage equal to $25 Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almost Certain (e.g. &gt;50% chance)</td>
<td>High</td>
<td>High</td>
<td>Extreme</td>
<td>Extreme</td>
<td>Extreme</td>
</tr>
<tr>
<td>Likely (e.g. between 50% and 90% chance)</td>
<td>Moderate</td>
<td>High</td>
<td>High</td>
<td>Extreme</td>
<td>Extreme</td>
</tr>
<tr>
<td>Moderate (e.g. between 10% and 50% chance)</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
<td>Extreme</td>
<td></td>
</tr>
<tr>
<td>Unlikely (e.g. between 0% and 60% chance)</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Rare (e.g. &lt;1% chance)</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

PUBLIC SECTOR
- Federal
- State

PRIVATE SECTOR
- Ports
- Conglomerates
- Transportation
- Manufacturers
- Medium & Small Companies

COMMUNITIES

EDUCATION

M. BURNS, TRB June 2014
Thank You!

Any Questions?

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References:

11) World Bank 2010-2014
14) TAPA, 2014