PortSec: A Port Security Risk Analysis and Resource Allocation System

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Outline

• Problem addressed
• What is PortSec?
• Current status of project
  – Incident response
• Next steps
  – Complete Tactical
  – Cyber/Physical Infrastructure
  – Strategic Analysis
Research Support

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The Problem – Three Competing Needs

- **Protection of the ports:** security
  - Provide jobs (locally and nationally)
  - Support import/export business
  - Critical component of the Nation’s supply-chain.
  - They are a major target of terrorism

- **Economic viability:** goods *must* flow
  - Need to minimize interruptions to business or increased cost of doing business
  - Excessively costly/disruptive protection causes economic harm to US, satisfies terrorist aims

- **Environmental costs:** green ports
  - Throughput delays due to security counter-measures impact the environment

Improve port security, minimize cost to business and environment
The Challenges

• **System of systems**: Ports and similar operations are composed of many different components (e.g., terminals, bridges, inspection points, etc.), agencies, and interactions between these "systems".

• **Dynamic operations**: These "system of systems" are dynamic - constantly changing both day-to-day and long-term.

Complex dynamic infrastructure -> difficult to model and analyze
Example Challenge: Over 13 different resources involved in POLA/LB security

- Los Angeles Port Police
- Port of Long Beach Harbor Patrol
- Los Angeles Police Department Harbor Division
- Long Beach Police Department
- California Highway Patrol
- U.S. Coast Guard
- U.S. Customs and Border Protection
- Los Angeles County Fire Department
- City of Long Beach Fire Department
- City of Los Angeles Fire Department
- U.S. Immigration and Customs Enforcement
- Los Angeles County Sheriff’s Department
- Federal Bureau of Investigation
- Others…

Goal: Can collaboration and resource allocation be improved?
PortSec

• A resource allocation system used to reduce risk primarily from terrorist-based attacks (for now)
  – Maintain port operations (business resiliency)
  – Minimize impact to environment
  – Addresses trade-offs between maintaining operations vs. minimizing risks from attack (includes minimizing consequences)

• Tactical:
  – Day-to-day adjustments of resources to reduce assessed risk of attack
  – Real-time incident response (current focus)

• Strategic: “what-if” analyzes to determine impact on port security due to future events (longer-term):
  – New counter-measures
  – Port improvements/modifications

Trade-off: Minimize threats vs. maintain port Ops vs. environment
Fundamentals: System of Systems

- Risk Model
- Risk Parameters & Relationships
- Port Operations Model
- Terminal Operations Model
- Transportation Model
- Cyber Testbed
- Cost Model
- Environmental Model
Tactical Usage: Port Security Officer

Initial prototype has undergone evaluation

Calculated Risk into the “near” future

List of Available/Used Countermeasures/Resources

Calculated Risk for the Highlighted Region

Resources Assigned to the Highlighted Region

Resource Allocation Options

Critical Regions Color Coded to Reflect Calculated Risk
Status

• Prototype 1.0: Supports tactical operation
  – Reviewed by POLA/LB – strong support
  – Regions of interest are based on MAST study
  – Risk assessment parameters & attack modes are based on MAST study
  – Currently updating risk model to reflect results from expert elicitations (which are on-going)
  – External systems (e.g., Marine Exchange) are simulated

Prototype 1.0 exhibits the look, feel, and performance of the actual system

Prototype 1.0: Working prototype undergoing evaluations
Next Steps

• Implement demonstration incident response (current focus – Dec 2011/Feb 2012)
  • Teaming with SAIC – link PortSec to UICDS
  • Establish connections with external data sources (i.e. no longer simulated)
    – Marine Exchange
    – CalTrans
  • Immerse into POLA Police operations
  • Update risk assessment model

• Complete tactical support development (May/June 2012):
  • Implement calendar-based event support
  • Establish remaining connections to external data sources (e.g., blue force tracking)
  • Establish connections to intelligence sources (e.g., SARs)
  • Complete modifications to risk assessment model

Goal: Mid 2012 - Tactical version of PortSec installed at POLB/LA
Incident Response – Resource Allocation

• Don’t want to over-allocate resources

• Resource allocation based on:
  – Distance to incident scene
  – Priorities
  – Capabilities of the resource

• Distance calculation – based on:
  – Time of day
  – Current congestion

• Backfill
  – Cover “space” left vacant
Cyber-Infrastructure

• Major Challenges faced today:
  – Understanding impact a cyber attack can have on the Nation’s physical infrastructure
  – Demonstrating to stakeholders the impact a cyber attack can have on their operations
    • Includes both direct and indirect economic costs
    • Public health
    • Symbolic

• Next Steps:
  • Link the DHS-funded DETER cyber testbed to PortSec. DETER allows:
    • Simulation of IT infrastructure
    • Simulation of cyber attacks (single or multiple)
  • Link to a macroeconomic model – Adam Rose
Cyber-Infrastructure

PortSec
[Infrastructure Model and Risk Assessment & Resource Allocation]

User Interface

Middleware

External Data Sources & Systems

CGE Economic Model

DETER Testbed [Cyber Infrastructure Model]

New Development

Extend/modify existing systems
Thank You

Photo Credit: POLA