OVERVIEW

- Introduction
- Systemigram
- Detection
- Action
- Resilience
- Crisis Simulation
- Conclusion
PROBLEM STATEMENT

- Small Boats......How small is too small???
MARITIME TRANSPORTATION SYSTEM

- Small Boats......How small is too small?
- What are the Components?
- What region?

- How do we do this?
THREAT SCENARIOS

- Small Vessel used as:
  - Water Borne Improvised Explosive Device (WBIEDs)
  - Smuggling Terrorist
  - Smuggling Weapons (can be CBRNE)
  - Small boat as an attack platform
  - Obstruction
  - Gain access to larger vessel
PROBLEM STATEMENT

- What is the applicability of systems thinking to the development of a small vessel security and resilience strategy for six identified threat scenarios for the Port of NY & NJ through the incorporation and synthesis of technological and organizational elements?
SYSTEMS APPROACH TO AN ATTACK

Detection → Preventive Action → Resilience

PROACTIVE ← REACTIVE
OVERALL DETECTION STRATEGIES
OVERALL DETECTION STRATEGY

- Covers the six scenarios identified in the beginning of the summer research
- Prepares the system to expect different scenarios
- Decreases the overall vulnerabilities
The first line of defense in a coherent technological system are the citizens.

They are the first responders in situations that involve the safety of the port.

They are best able to judge whether activity in their marinas, near critical land structures, and in their home port is suspicious.
The satellite system faces limitations that prevent it from being extremely useful in real-time small vessel detection.

The satellites used during this research can detect vessels larger than 10m and wakes created by small vessels.

Based on these limitations we decide that the satellites are not convenient in the pre-attack section.

Satellite are useful in pattern recognition.
HF RADAR

- Are very useful to detect vessel's distance and velocity.
- Gives real time data, allowing the proper agencies to take action on the situation before it occurs.
- This technology is the first real-time technological line of defense.
Using passive acoustics technology, we will detect any object that emits sound underwater.

In this recommended detection strategy data processors rely on a collection of previously recognized motor sound signatures, to better identify the size and speed of the vessel in question.
Electro-optic technologies, such as infrared imaging, play an enormous role in night surveillance and are accurate in sensing otherwise undetectable small vessels, namely kayaks.
VIDEO SURVEILLANCE

- CCTV network is used in London and New York for city surveillance
- Use of private camera feeds
- Similar network can be created for coast-wide surveillance
- Boat ramps, Marinas, Buoys, Bridge Piers, etc.
SYSTEM DETECTION

- HF radar system to provide longer range detection of vessel speed.
- Use of ship borne radar to augment detection capabilities
- Bearing and intensity is given by acoustic.
- IR technologies provide that crucial near-range detection capability.
The most likely targets will be cruise ships and cargo ships.

The best detection for these situation will be the citizens and workers near coastal area.

HF radar and acoustics will be very useful in tracking the vessel’s path.
SMUGGLING TERRORISTS/WEAPONS

- Smuggling groups will try to reach remote areas and avoid security patrols.
- Satellite images will give us the warning of any uncommon path around the coast.
- Constant patrols and citizen vigilance will be the better method of detection.
VESSEL AS OBSTRUCTION

- Satellite will play a tremendous role pinpointing the exact location of the obstruction.
- Give information for alternative routes for shipping lines to continue with their operations.
GAIN CONTROL OF A LARGER VESSEL

- Human intelligence is essential in preventing this situation.
- In terms of technologies HF radar and acoustics can track any vessels near the larger vessels and under water threats.
RECOMMENDATIONS ON DETECTION

- General public seminar to learn to notice suspicious activities.
- Report all suspicious activities to one specific well-known agency.
- Research in plotting data on a more visible way, like google earth. This will allow us to track the vessels more easily.
OVERALL ACTION STRATEGY
SCENARIOS

- Using a small vessel
  - As a WBIED
  - To smuggle terrorists
  - To smuggle weapons of mass destruction
  - As an obstruction
  - As an attack platform
  - To gain access to a larger vessel
SIMILARITIES BETWEEN SCENARIOS

- The way the scenarios are carried out
  + The vessels used for each scenario
  + The behavior of vessels when approaching a target
  + Behavior of vessels when smuggling persons or WMD’s
SIMILARITIES BETWEEN SCENARIOS

- After effects
  + Loss of life
  + Environmental Damage
  + Psychological Impact
  + Disruption in Ship Movement
  + Impact on Tourist Activity
  + Economic Impact
WBIED

- Most likely target would be of high value
  - High loss of life
  - High economic loss
- Action to be taken:
  - Civilians report suspicious behavior
  - Law enforcement narrow down on suspects
    - Use HF Radar-Velocity
    - Electro Optics- Night Visuals
    - CCTV-Surveillance of suspects path
- Recommendations: Use waterborne barriers
SMUGGLE TERRORISTS/ WEAPONS

- Behavior associated with these scenarios creates difficulties for detection and therefore an added difficulty for action strategies
- Action to be taken:
  + Civilians notice suspicious vessel and report to authorities
  + Authorities of area where report was made share information with surrounding areas
  + Acoustics and electro optics used to pinpoint location of vessel
- Recommendations: Can not be planned for
OBSTRUCTION

- Most likely targets: Shipping channels and areas of high vessel traffic
  + Psychological impact
  + Economic Impact
- Action to be taken:
  + Satellites
    - Pinpoint location of vessel
    - Updated information for alternative routes for shipping lines
- Recommendations:
  + Salvaging companies and tug operators to move vessels
  + Waterborne barriers
ATTACK PLATFORM

- The only time you know when a vessel is being used as an attack platform is once it has already fired a weapon from the vessel.
- Most likely targets: expensive and critical real estate around the port area.
- Actions to be taken:
  + Civilians report suspicious activity
  + Video surveillance of area to keep track of the vessel
- Recommendations:
  + Targets are on land so involve land based law enforcement
  + Departments that traditionally don’t deal with maritime matters but have an action plan for an attack platform scenario
GAINING ACCESS TO A LARGER

- Most likely target: Any large vessel
- Action to be taken:
  + HF Radar system and acoustics should be used to find the exact location of the small vessel
- Recommendations:
  + The large vessel should have it’s own action plan
    ✗ Captain should have
      ✳ entryways into the cabins locked
      ✳ crew stand watch to look for suspicious approaching vessels
      ✳ water cannons ready to be operated
FORMS OF DETECTION

- Vigilant Civilians
- HF Radar
- Acoustics and Electro Optics
- Satellites (pattern recognition and post attack clean up)
RESPONSE

- Crime Scene – Owner (Insurance)
- Oil and Debris – Clean-up Issue
- Water – Land Operation (Jurisdiction)
- Ship Salvage – Navy
- Contract to move ship
- Business Continuity Plan
JURISDICTION

Water
  COTP
    ICC
      Fed.  State  Local  Owner

Land
  Mayor
  Governor  Guard
  Federal  FEMA
OVERALL RESILIENCE STRATEGIES
RESILIENCE

• The ability of a system to bounce back to a baseline state after being disrupted by a shock

• Examples in Maritime Systems:
  + Transportation System
  + Economic Flow
RESILIENCE STRATEGIES

- Reduce the probability of an attack to the system
- Minimize the bounce back period of time the system needs to recover from an attack
FIRST RESPONDERS

- Vessel used as Obstruction
- Gain Control of Larger Vessel
- WBIED Attack
- Vessel used as a Attack Platform
- Smuggling TERRORISTS/Weapons

- Confusion
- Delay

First Responder Public Education Program
- Knowledge Sharing Programs and Network Interface
- Drills and Simulations
- Professional Education Programs

Miscommunication and Coordination Amongst Actors/Overlapping Jurisdictions.
INCAPACITATED SHIP

- Vessel as an Obstruction
- Gain Control of Larger Vessel
- WBIED Attacks
- Vessel used as an Attack Platform

1. Incapacitated Ship
2. Move ship to Anchorage
3. Navy Lack of Resources for Salvaging
4. Database of Ship Salvaging Companies
5. Moving Ship to Anchorage (Cranes, Floating Dry Docks, Tugs)
6. Impedance/Stoppage of Flow and Commerce in Port
INLAND TARGET ATTACK

Vessel used as a Attack Platform. → Inland Target Hit → Block Off Area. → Reroute Ships In Harbor. → Impedance/Stoppage of Flow and Commerce in Port.

Emergency Management and Law Enforcement Collaboration → Evacuation and Urgent Medical Care.

Miscommunication and Coordination Amongst Actors and Overlapping Jurisdictions → Knowledge Sharing Programs and Network Interface.

Professional Education Program → Drills, and Simulations.
TERRORIST ACTIVITY

Smuggling Terrorists/Weapons → Identification Terrorists Activity and Location → Profiling and Information Sharing → Maritime Security Intelligence Collaboration → Integration of Universal knowledge →

Terrorist Tracking Database for Federal agencies and Private Stakeholders →

Track Terrorists Stoppage at Entrance to Port → Presents a threat to Citizens or Traffic in Port → Impedance or Stoppage of Flow and Commerce in the Port.
MONDAY JULY 26 CRISIS SIMULATION
GOALS

- Create a dynamic detection scenario
- Bring together the four SRI groups and demonstrate their capabilities to group representatives and faculty
- Identify the gaps still remaining
- Identify what the next Summer Research Institute should focus on
Two vessels R/V Savitsky and 21-foot rubber fast boat

R/V Savitsky had a north to south route

Fast boat proceeded south to north

Target was the Carnival Glory cruise ship, represented by the Stevens buoy

Four groups present at 1200 MSL Babbio

Both vessels present at their waiting places at 1200

Cruise Ship Carnival Glory
WBIED hits at 1230

Map of Monday July 26
Crisis Simulation

1200-1215: Pre-attack systems presentation

1215-1230: Real-time detection period/
Concurrent systems presentations

1230: WBIED hits Carnival Glory

1230-1240: Post-attack systems presentations
PRE-ATTACK 1200-1215

• 1200- Detection groups were presented with introductory videos
  + Civilian dock workers
  + NJSP-USCG
  + COTP
  + COTS

ATTACK 1215-1230

- Intelligence analyst → Provided crucial information for the assembled groups
  + Mistaken information
- R/V Savitsky and rubber fast boat began to move towards the target
- Acoustics and HF Radar began to search for suspicious vessels
SYSTEMS PRESENTATIONS DURING

- Satellite Role in pre-attack period and response period
- COTP - MARSEC Level 1→2
- COTP - Mayor-Interagency tensions
- COTS - Evasive actions taken by Carnival Glory
WBIED HITS CRUISE SHIP
POST-ATTACK (1230-1240)

- Breaking Newscast
  + Fear
  + Economic Damages
- COTP- MARSEC 3
- Terminal Operator Perspective
OEM RESILIENCE STRATEGIES

- Coordinate with NJ OEM to do the followings:
  + Emergency responders access to the site
  + Extinguishing the fire aboard the ship
- Injured passengers care and transport
- Transportation system management:
  + Shutting off the ferries / subways
  + Rerouting the ships and cruises coming into the harbor or keeping them waiting
- Notify the ships that will be coming into the harbor of the security issue
- Public information broadcast to let people know the area is not safe
LESSONS LEARNED

- Detection groups were able to detect vessels right away (particularly R/V Savitsky)
- Limitations were overcome through cooperation
LESSONS LEARNED (CONT.)

- Hard to determine what is nefarious activity
- Crucial need for inter-group communication
- Need for better integration of detection systems
  + Include ship radar systems in an overall detection network
  + Private CCTV can be used to keep the harbor under watch
- Conclusion ➔ Without direct law enforcement involvement detection is moot
CONCLUSION

- Six scenarios (DHS/self-identified)
- Tools/Methodology
  + Systemigram
  + Flow Diagrams
- DARs
  + Overall
  + Scenario specific
- Simulation
OVERALL DETECTION

- Civilians
  - Most familiar with port environment
  - Includes terminal, transportation and vessel operators
  - Need to work on public/private partnerships
  - Marine security education programs
    - Safe boating
    - Noticing suspicious activity
OVERALL DETECTION

- Satellites
  + Vessel as an obstruction
- HF Radar
  + Tracking WBIEDs, vessels used as an attack platform, and vessels gaining access to larger ship
  + Surface current/vessel velocity
- Acoustics/Electro-Optics
  + Tracking vessels that are smuggling weapons/terrorists, especially those occurring at night or underwater
OVERALL ACTION

MTS consists of:

- Technology operators
- Balance between human and AI
  - Basis of cognition
- Jurisdictional issues
- Clean up issues
OVERALL RESILIENCE

- Immediate response effort flow diagrams
  + Educating first responders to attacks
  + Minimize loss of life
  + Minimize economic damage using business continuity plans
  + Clean up efforts
SIMULATION

- Detection was successful
- Cooperation is key
  + Between detection groups
  + Law enforcement
- Recommendations
  + Create a ‘safe area’ using multi-layered defense system comprised of detection technologies and preferential law enforcement
FUTURE RESEARCH

- Though this was just a preliminary study, these findings provide the basis for future research in the field of maritime domain awareness.
QUESTIONS?
QUANTIFYING THE THREAT

Examples of Probabilities:

\[ P(x=a) = \frac{B-A}{B} \]

\[ P(A \mid B) = \frac{P(A \cap B)}{P(B)} \]