Virtual Interoperable for Security & Safety Assessment and Training

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Simulation Team
Who We Are?

Universities, Research Centers and Companies operating worldwide in synergy for developing Innovative Solutions with a particular focus in Modelling and Simulation.
Scenario: the Port

- Various players in a diversified scenario
- Numerous existing systems and solutions
- Different operators (civilian and military)

BUT

- Common objectives and needs
Threats and Incidents

• What has to be prevented?
  – Thefts
  – Smuggling
  – Narcotics
  – Terrorism
  – Fraud
  – Clandestine individuals
  – Vandalism
  – Organized crime
  – Environmental crime

How to achieve the objects?
• Organization and Procedures
• Infrastructures and facilities
• Training
• Regulations and Standards

- Action and/or Prevention?
• Threat Intensity
• Alert Levels
• Inspections
• Planning
• Operative Support
Why Simulation?

Simulation for Training and Operative Analysis

– Distribute
– Interoperable
– Cooperative and competitive
– Simple and easy to implement
Port Security and Safety

Procedures
Plans
Technologies

Reduce Port Vulnerabilities
Increase Protection Capability
Increase Security

ISPS = MARSEC = HSAS

<table>
<thead>
<tr>
<th>Security Level</th>
<th>MARSEC 1</th>
<th>MARSEC 2</th>
<th>MARSEC 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Guarded</td>
<td>Elevated</td>
<td>High</td>
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<tr>
<td>Elevate</td>
<td></td>
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<td>Serum</td>
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A State of the Art Overview

Normative and standards after 9/11:
- Container Security Initiative (CSI);
- International Convention for the Safety of Life at Sea (SOLAS);
- Maritime Transportation Security Act of 2002 (MTSA);
- Convention for the Suppression of Unlawful Acts (SUA);

Not provide support in terms of methodologies, tools, equipment and do not evaluate the impact of security advances on the overall efficiency of a marine port.

- Conduct simulations to what extent a simulation model could predict the actual container terminal operations with a high order of accuracy (Shabanek and Yeung, 2002).
- Use simulation for optimizing specific scheduling and resource allocation problems (Gambardella et al., 2001).
- Use the simulation for comparing two different container terminal scenarios in relation to handling equipment and their impact on the capacity of the terminal (Kia et al., 2002).
- Use simulation for port design and as a decision support tool (Ottjes et al., 2006).
Survey on Recent Port Security

After 9/11 the research works start to consider the marine terminal security

Propose an approach for evaluating the balance between the percentage of containers to be inspected and the delays of the departure vessels

Lewis et al (2002)

Propose a detailed analysis of the measures being undertaken for ports vulnerabilities a list of security precautions to be adopted within container terminals.

Longo & Bruzzone (2005)

Develops a research work have on the effects of security procedures on the global supply chain, by considering the impact of catastrophic events

Longo (2007)

By using simulation show that the increase of physical containers inspections beyond a single digit percentage brings main port operations to a halt

Wenk (2004)

Present global metrics for logistic facilities security (including marine terminals)

Bocca et al (2005)

Investigate the integration of containers inspections operations within the normal port operations by combining simulation, design of experiments and analysis of variance

Longo et al (2005)

Bruzzone and Longo (2005)

Longo et al (2009)
Virtual Port

Simulation Team is Involved in Development of Virtual Simulation with special attention to Driving Vehicles and Equipment within Logistics Environment. These Virtual Simulation have been extensively used in Training Session for Professional Operators (trucks, intermodal cranes, port cranes, etc.)

The solution in use are real-time distributed simulation based on High Level Architecture allowing compositibility, modular approach and cooperative/competitive exercising.
VISSAT (Virtual Security and Safety Assessment and Training) allows to Simulate Security and Safety Issues in Complex Framework such as that one related to Port Environments.

VISAT includes Constructive Sim of organizations and layouts as well as Synthetic Environment for Virtual Sim supporting Distributed Cooperative Training among different Actors (i.e. Port Authority, Coast Guard, Custom Resources, Terminal Operators, Public Urban Authorities) within different Scenarios.
Sample of Federated Objects

- SHIPS (CGF)
- THREATS (CGF)
- PILOTS, TAG MOORING
- VIRTUAL YARD CONTROL
- AUV/UAV
- LOGISTIC NETWORK
- CUSTOM OPERATIONS
- POLICE and SECURITY
- ENVIRONMENT IMPACT
- INTELLIGENCE
## Live Virtual & Constructive Interoperable Solutions - 1

<table>
<thead>
<tr>
<th></th>
<th>AUV/IUAV (CGF)</th>
<th>Vessels (CGF)</th>
<th>Terminal</th>
<th>Nautical Services</th>
<th>Intelligence</th>
<th>Environment</th>
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<tbody>
<tr>
<td><strong>Live</strong></td>
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<td><strong>Virtual</strong></td>
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## Live Virtual & Constructive Interoperable Solutions - 2

<table>
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<tr>
<th></th>
<th>Custom</th>
<th>Town</th>
<th>Region</th>
<th>Coast Guard</th>
<th>Firefighting</th>
<th>Threats (CGF)</th>
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VYC (Virtual Yard Control) allows to integrate Real-Time data collected from Real Equipment, Status from Reservation Areas and DBase of the Terminal ERP Solutions in order to provide a Up-to-Date Picture of the situation for Coordinating Resources or Future Status Occupancy and Saturation in order to Help Yard Planner.
Seaports concentrated in developing simulation models to support Security in Ports in terms of Risk Assessment, Training, Security Solution Analysis, etc. The initiative is modeling ports, terminals, operative procedures, regulations & policies. The model was successfully applied to evaluate the impact of ISPS, MTSA and SCI evolution in large container terminals. A demonstrator for educational purposes is available on: www.liophant.org/projects/secsim
TRAMAS: Logistic Network & Town

Port and Terminals represent a strong impact on Urban Environment from many point of view especially Security. Simulation Team developed Analysis and Consulting Packages based on Modeling and Simulation to support an effective integration.
A Port it is a node in a Complex Logistics Networks. Simulation Team developed solution to model a Region or Country with very high details for defining Policies and Regulations as well as Strategies and Development Plan. Risks related to all the factors including demand and rate stochastic evolutions are part of the Models to create an Effective Decision Support System.
Conclusions: Maritime Home-Land Protection and Safety

Homeland Protection and Safety require today best solution in term of Interoperable Simulation for combining all the different aspects affecting risks in this framework. Simulation is active from many years in this area.
References

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