Development and Certification of the Secure Hybrid Composite Intermodal Shipping Container

Advanced Development for Security Applications Workshop
Customs and Border Protection (ADSA-CBP-01) June 21, 2018

Presented by Dr. Anthony Viselli, PE, Manager, Offshore Structure Design and Testing

THE UNIVERSITY OF MAINE

ADVANCED STRUCTURES & composites center

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Georgia Tech Research Institute

Overview

- **Space:** *Cargo Security*
- **Problem:** *Easy to access container by cutting holes and repairing. There is currently no reliable six-sided intrusion detection capability for shipping containers.*

  This presents a significant security risk for the US including smuggling of dangerous explosives into the country and a major loss in revenue due to theft for commercial shipping.
- **Solution***: Hybrid Composite- Steel Container with six-sided Intrusion Detection and Tracking Capabilities*
- **Results:** *Container design developed, 3 prototypes produced, certified according to ISO 1496, and trial shipments made. Commercialization underway.*
- **TRL:** *9*
- **Point of Contact:**
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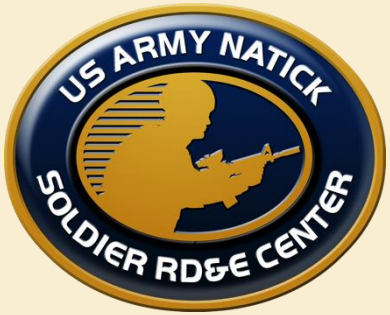
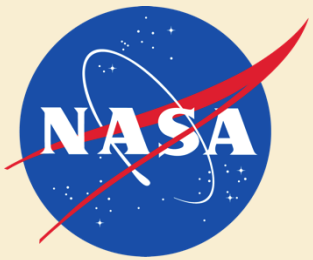
World's-First ISO-certified Secure Hybrid Composite Container.
Patent No. US 8865285 B2, US 8531292, US 8487763

- Founded though the NSF in 1996
- 180 faculty, staff and students/year
- 100,000 ft^2 lab
- 2,000+ students funded from 35+ majors at UMaine
- Spinoff companies

Over $110 Million R&D

Major Funding Agencies:





NIST
National Institute of Standards and Technology
U.S. Department of Commerce

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Advanced Structural Design, Manufacturing, and Large Testing Under One Roof

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Ocean Simulator
Advanced Model Testing Capabilities

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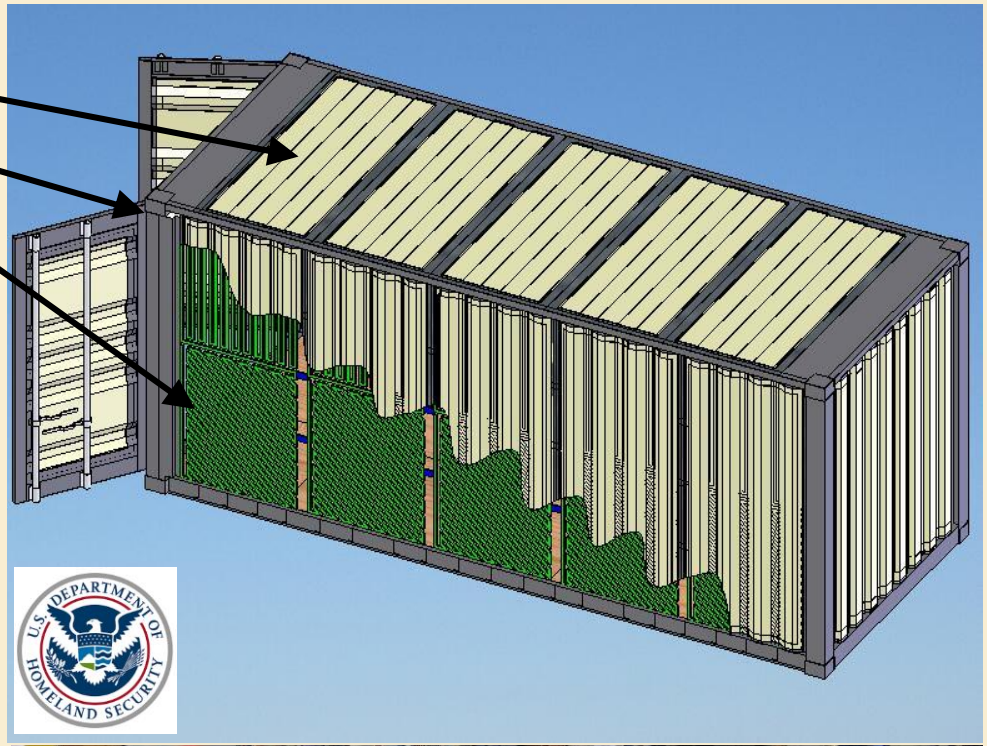
Secure Hybrid Composite Container Design

Container Features

- Weldable composite wall, roof, door, and floor panels
- Steel perimeter frame and corner castings
- **Embedded sensors**: six sided intrusion detection and door opening detection
- World-wide tracking and logistics telemetry
- 95% of container surface area is composites with embedded sensors, ~20% lighter
- Keep manufacturing process similar: Can be assembled anywhere in existing steel container plants
- Keep inter-operability. No changes to "look" and "feel" of container; this includes walls and floor.
- Repair with steel welding.
- Easier to scan and communicate from within container
- Opportunity for expedited customs?



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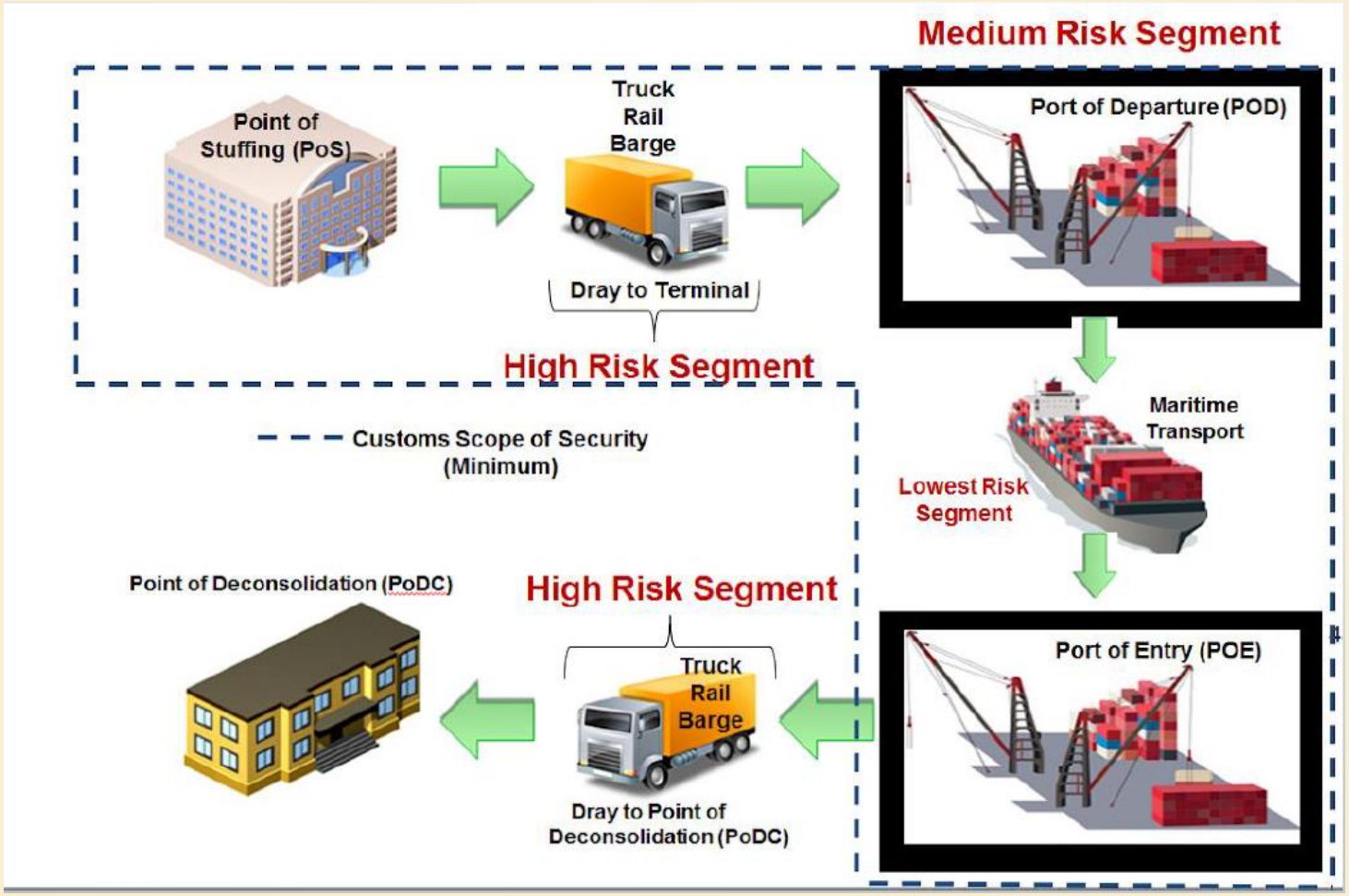
Operational Risk of Cargo Movement



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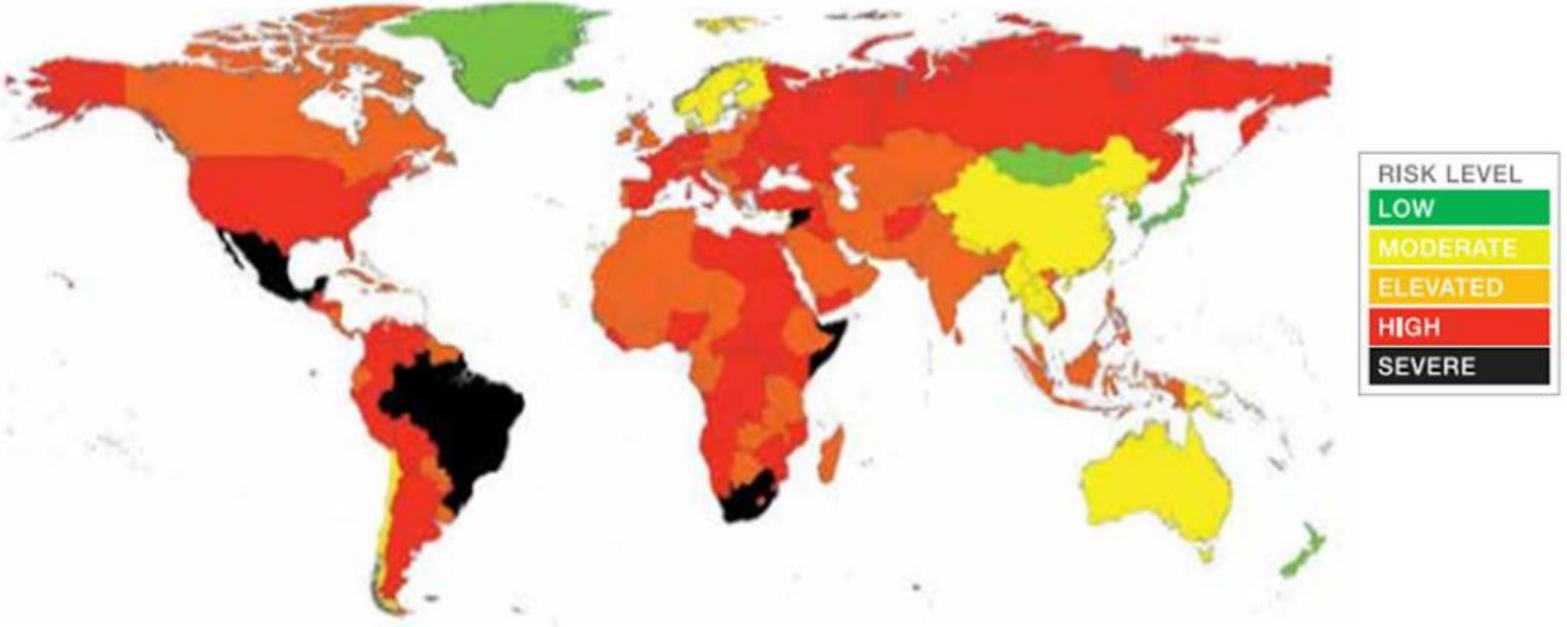
Cargo Lost or Stolen: $50 Billion/Year

- 130 million container shipments per year, $4 Trillion value
- National Cargo Security Council: $50bn annual value of cargo lost or stolen
- Cargo theft is the biggest supply chain risk: $23 Billion increasing by $1Billion/year



Cargo theft is indicative of risks to global supply chain.

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Over 15 years of R&D with US Department of Homeland Security

- **2003-2006:** DHS Science and Technology initial R&D.
- Advanced Container Security Device Program
- **2007-2010:** Full-scale construction and testing of containers by independent ISO test facility. Collaboration with GTRI.
- **2010-2013:** R&D of intrusion detection system with Georgia Tech Research Institute. Successful 3rd Party ISO testing and ISO Certification of design with security features.
- **2013-2017:** Commercialization Efforts Underway

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ISO 1496-1 Testing:
All Requirements Passed






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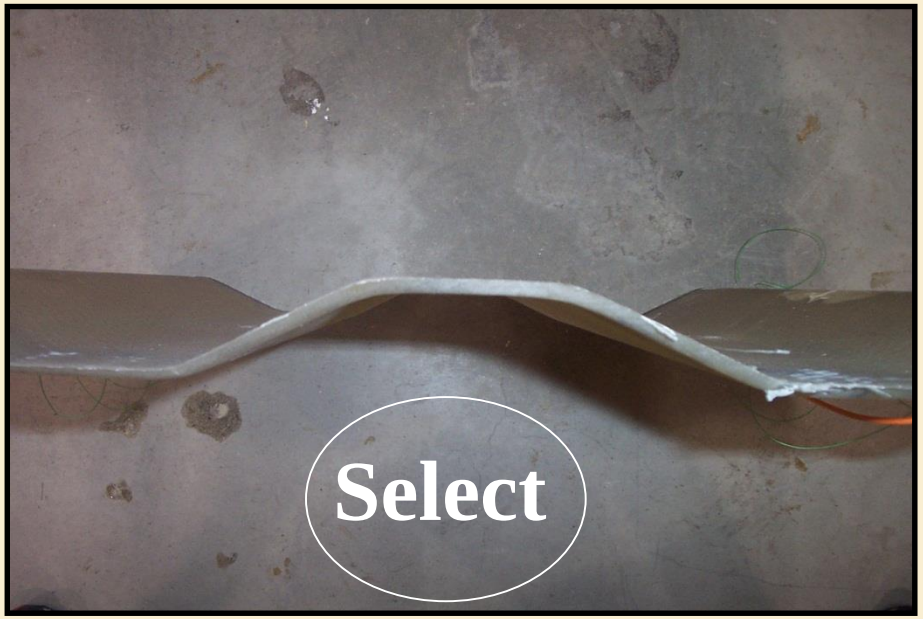
Impact Toughness: Composite vs. Steel



Steel Control Panel:
1-3/8 inch deep dent.
Repair needed.
Cannot embedded sensors,
high false alarms

Composite Panel
No Dent. All sensors survive.
~ 30% lighter
Low False alarms

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Shanghai – Savannah PILOT

2010-2011

Georgia Tech Research Institute

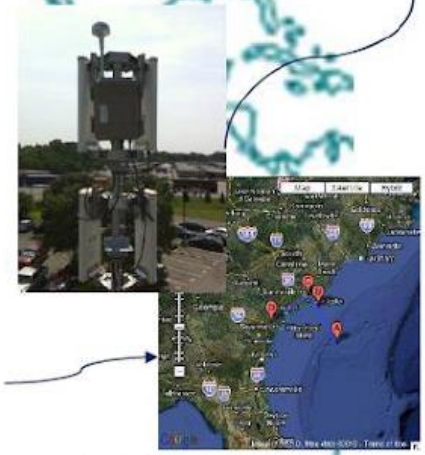
Depart Factory, Shanghai

Delivery to DC, Atlanta

Arrive Terminal, Shanghai

Sailing Shanghai

In route via the Panama Canal



Arrival Port of Savannah, GA

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Questions?

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