Cargo Security: The Calm Before the Storm -- Productivity, Regulation & Technology

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Transportation Security Plenary Session
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The Main Messages

1. Done right, we can have our cake and eat it too on supply chain security and productivity

2. Smart container & trailer technologies will transform best practices

3. Terrorist threats make the regulatory rules of the game unstable

4. Message #3 may distort #1 and #2
Making Sense at the Intersection of

- Supply Chain Systems
- Freight Operations
- Tracking & Monitoring Technologies
- Business Economics
- Security
Sources & References for
Supply Chain Security, Productivity, & Technology*

Security and productivity
- “The Dynamics of Supply Chain Security” (for the G-8, 2004)
- “Supply Chain Security Without Tears” (2003, with Hau Lee)
- “Freight Transportation Security and Productivity” (2002)

Technology for security and productivity
- “Mechanical Seal Market Analysis” (2005, with Ken Troup)
- Smart Container Product and Market Reports (2004, with HSRC)

*Articles and papers by Mike Wolfe
Outline

- The Rules of the Game are Unstable
- Supply Chain Security & Productivity
- Smart Container & Trailer Technologies
- Market Dynamics & Forecast Scenarios
The Unholy Trinity of Cargo Security Threats

- **Theft**  
  Pre-9/11

- **Contraband**  
  Pre-9/11
  - Drugs
  - Customs evasion
  - Counterfeit and gray market goods
  - Stowaways

- **Terrorism**  
  Post-9/11
  - High potential for trade disruption
Threats, Countermeasures, and Impacts

Threats and Assessments

Security Countermeasures

Terrorist Events

Recovery Measures

Impacts

Indirect, Secondary Impacts
- Costs, delays, unpredictability

Direct, Primary Impacts
- Damage & disruption
- Congestion & disruption

Emergency response
Potential for Self-Inflicted Wounds

“How rational will ‘we’ remain after a second or third major terrorist attack?”
Regulatory Dynamics

Threats and Assessments

Security Countermeasures

Terrorist Events

Indirect, Secondary Impacts

Costs, delays, unpredictability

Direct, Primary Impacts

Inherently Unstable

“What are the implications for your business?”

“Next Event/Overreaction?”
Outline

▶ The Rules of the Game are Unstable

▶ **Supply Chain Security & Productivity**

▶ Smart Container & Trailer Technologies

▶ Market Dynamics & Forecast Scenarios
Security Needs From Logistics

- Assured integrity of conveyance loading and documentation
- Significantly reduced risk of undetected tampering in transit
- Accurate, complete, and timely information about shipments

Smart container technologies contribute most in these areas
Logistics Needs From Security

- Reliable, predictable processing times
- Protection of commercial information
- Globally harmonized security processes
- Security as a byproduct of supply chain management

*Technology can have great impact here*
The Leverage Point...

...is technologies and processes to enhance cargo visibility and control
- Goods in transit
- Conveyances and equipment
- Assured chain of custody

Smart container, smart trailer, and smart shipment technologies
Auto ID Technologies

**Conveyance**
- Bar code & 2D labels
- RF tags
- Satellite transponders

Every shipment is a chain of nested transactions that should be transparent.
Business Attractions of Smart Containers

- Better container tracking information
  - Enable capacity optimization – manage congestion effects
  - Reduce time, cost, and service quality impact of misrouted containers

- Reduce labor impacts
  - Cost and workload

- Increase chain-of-custody seal validation
  - Automation rather than human (non)inspection
Making Money from Better Visibility and Control

Benefit model categories:

- Better operating efficiency
  - Fleet, equipment, and labor utilization
  - Less wasted effort
  - Mitigate congestion impacts

- Better operational effectiveness
  - More reliable service
  - More flexible operations
  - Customer inventory savings

- Shipment integrity
  - Less theft of goods and services
## Quantitative Benefit Estimates

<table>
<thead>
<tr>
<th>Technology/Process</th>
<th>Dollar Range</th>
<th>Unit of Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset tracking, mobile communications (ref. 6.B)</td>
<td>$7,866 and $15,222</td>
<td>Annual savings per tractor</td>
</tr>
<tr>
<td>Asset tracking, chassis tracking (ref. 5)</td>
<td>$210.35</td>
<td>Annual savings per chassis</td>
</tr>
<tr>
<td>Asset tracking, containers with RFID (refs. 7.A, 7.B)</td>
<td>$400</td>
<td>Benefits to shippers per container load</td>
</tr>
<tr>
<td>Freight status information, ESCM and biometric ID (ref. 1)</td>
<td>$13.00</td>
<td>Time and labor savings per air freight shipment</td>
</tr>
<tr>
<td>Gateway facilitation among ports, highways, and border crossings (ref. 2)</td>
<td>$12.8 to $24.8 million</td>
<td>Annual regional savings</td>
</tr>
<tr>
<td>Network status information, FIRST-like capabilities (ref. 3)</td>
<td>$21.36 and $247.57</td>
<td>Savings per terminal trip</td>
</tr>
</tbody>
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*Source: Draft report prepared by North River for FHWA*
Outline

◆ The Rules of the Game are Unstable
◆ Supply Chain Security & Productivity
◆ **Smart Container & Trailer Technologies**
◆ Market Dynamics & Forecast Scenarios
The Smart Container Books

- Smart Container Technology and Market Forecast, 2004-2012

- Smart Container Product Comparison Report, 2004
Main Elements of the Smart Container Technology & Market Study to 2012

- Analysis of regulations and standards
- Market drivers, inhibitors and dynamics
- Current technologies
- Product & technology outlook
- Market & pricing outlook
- Economic assessment – costs, benefits, & cost/benefit
- Vendor outlook and profiles
- Smart container patent review
What is a Smart Container?

◆ Three main ingredients
  – Processing power
    » Sensors, memory, & decisions
  – Communications
  – Electrical power

◆ Two sets of benefits
  – Supply chain management
  – Supply chain security

No box is really smart except as part of a smarter network
Smart Container Technologies

- Container tracking
  - Long-distance mobile
  - Short-distance point - RFID

- Processing power and sensors
  - E-seals & intrusion detection systems
  - Cargo condition and threat detection sensors
Potential Sensor Suites

◆ Productivity
  - Container full/partial/empty
  - Temperature/cargo condition
  - Location

◆ Security
  - Doors open/doors closed
  - Intrusion detection
  - Explosives
  - Nuclear/radiological
  - Chemicals
  - Human presence
  - Biological agents (if feasible)

◆ Device operation
  - Battery & self condition
Advanced Security Devices

- “Future Smart Container”
  - Wolfe, Container Working Group, early ’03

- Advanced Container Security Device
  - HSARPA 3 phase competition, 6 winners so far
    - “6 wall” intrusion detection
    - Human presence
    - Sensors
Essence of the Technology and Price Analyses

- Present generation equipment
  - Evolution into effective supply chain management tools
  - Moderate security value
  - “Supply chain smart computer”

- Next generation equipment, >2008
  - Higher security value
  - Develop out of ACSD program
  - “High security smart container”

- Commercial value will reside in the supply chain SC

- Added capability of high security SC won’t pay off commercially
  - It is more a national security than business benefit
  - Except for niches, adoption will require incentives or mandates
Despite Our Forecast, Some New Players Assert They Solved the Puzzle. For example...

- Detects
  - 6 wall intrusion detection
  - Radiation
  - Targeted chemicals
  - People
  - Cargo shifting

- Radio Structural Scanning (RSS)
  - Microwave technology

CSC--as in Container Security Corp.
Outline

- The Rules of the Game are Unstable
- Supply Chain Security & Productivity
- Smart Container & Trailer Technologies

- Market Dynamics & Forecast Scenarios
Supply chain security is *not* a typical new technology market
- Regulations drive as well as economics
- Politics and emotion can dominate security regulatory processes

*Following slides emphasize containers.*

*Same analysis applies to trailers.*
Smart Conveyance Market Dynamics

- Market drivers include
  - Powerful long-term price/performance trends
  - Customer demands

- Market inhibitors include
  - Skepticism about costs and efficacy
  - Resistance to regulation

- Biggest factors: economics & regulations
# Forecasting Smart Conveyance Growth

**SMART CONTAINER MARKET DYNAMICS:**

**FRAMEWORK FOR MAJOR DRIVERS**

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<td>Two Major Drivers</td>
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## Smart Container Market Dynamics

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Main Driver of Regulatory Demand for Smart Conveyance

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- North River Assessment:
  - High regulatory pressure for smart container or trailer adoption can come only after a meaningful supply chain-oriented terror event

- Scenario I, 2004-2012:
  - No relevant terror event

- Scenario II, 2004-2012:
  - Relevant terror event in 2005
**Highlights of Scenario I, 2004-2012:**

No Meaningful Relevant Terror Attack

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**Low Regulatory Pressure**

- Classic new technology introduction, with a boost from war on terror (R&D, pilots, etc.) (Cell I)
- Competitive pressures will shift market decisively as successful early adopters reap benefits (Cell III)
- Smart conveyances will become accepted best practice for supply chain operations during forecast period
- Security benefits
  - Significant reduction in cargo theft and smuggling
  - Enhanced protection against terrorist exploitation

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# Highlights of Scenario II, 2004-2012: Serious Container Terror Attack in 2005

## High Regulatory Pressure

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- At time of attack, smart container benefits still unproven (Cell I)
- Political overreaction to attack produces premature mandates for smart container technologies (Cell II)
- Forced use accelerates learning curves for benefits (move towards Cell IV)
- Market for and use of smart containers builds faster and higher than Scenario I
- Security benefits
  - Significant reduction in cargo theft and smuggling
  - Enhanced protection against terrorist exploitation

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Product and Marketing Implications

- Due diligence should assess multiple market environments

- Not all smart conveyance solutions are equal
  - Supply chain management + some security benefits
  - High security next generation solutions

- Focus on the business case for users
  - Favorable economics is the most dependable driver
Keep Technology in Perspective

◆ Technology is not magic
  - “Just because it’s electronic doesn’t mean it’s better”
  - Good processes and discipline are critical
  - Institutional challenges are toughest

◆ Technology is not irrelevant
  - “Just because it’s electronic doesn’t mean it’s a mistake”
  - Smart technology can
    » Enhance good processes
    » Simplify demands on the workforce
Big Picture Conclusion on “Supply Chain Smart Containers”

- With or without security pressures …
- With or without ACSD research …
- Smart containers will be deployed for commercial reasons, to make money for users
  - The question is when and how, not whether
  - Moore’s Law will bring them to the market

In 1985, satellite monitoring of trucks seemed like a pipe dream.

In 1990, Schneider National deployed Qualcomm’s OmniTRACS
Thank you for your attention

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781-834-4169
Sources & References for
Supply Chain Security, Productivity, & Technology*

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    » Journal of Commerce, July 26, 2004
    » G-8 Summit edition of The Monitor, Univ. of GA, Center for International Trade and Security
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    » email from Mike Wolfe
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    » Reachable from the Intermodal Freight page at http://www.its.dot.gov/ifreight/ifreight.htm
    » Email from Mike Wolfe (noriver@att.net, 781-834-4169)

*Articles and papers by Mike Wolfe
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