Macro Supply Chain
Security Decision Analytics
ACSAC 2014

Gio Kao, Jason Hamlet, Ryan Helinski, John Michalski, and Han Lin

Contacts: gkkao@sandia.gov, hwlin@sandia.gov

Sandia National Laboratories
Develop Fundamental Analytics Framework for Enabling Supply Chain Decision Analytics

Networks of suppliers

Layers of manufacturers

Webs of distributors, wholesalers, retailers

How much risk are you willing to take?
Problem Statement – Why are we here?

- **Current approaches in addressing supply chain security and integrity…**
  - Do not address complexity and scalability
  - Prioritize on cost without security in mind
  - Lack scientific and engineering foundation
  - Provide localized point-based solutions
  - Are reactive
  - Are disjoint (lack visibility and cooperation along the supply chain)

**Supply Chain is a global problem!**

We are making tools that will analyze supply chain integrity and provide decision support to strengthen your supply chain.
Where we are heading:

- **Key Contributions (paradigm shift)**
  - Developed supply chain integrity analytic framework
    - Holistic lifecycle-based approach for full spectrum supply chain flow analysis
    - Reduce subjectivity while increase objectivity
  - Developed optimization tool for cost-benefit decision analysis
    - Repeatable, concise, rational decision making

Provide insights for decision makers and analysts to perform risk-based, cost-benefit decision support under uncertainty.
Supply Chain State-of-Health

Larger Area = More Risk

- Control and Influence
- Visibility
- Diversity
- Exposure
- Reputation
- Financial Strength
- Criticality
- Foreignness

Indicators provide insights/measure of susceptibility to supply chain vulnerability

Each color represents different vendor/process in the supply chain lifecycle
Web-Interface (Matrix Representation)

- Hierarchical matrix representation
- Identify entity relationships and partial information flow
- Enable visualization of indicators