



Intelligent Freight

*Real Time Freight Supply  
Chain Systems & Services*

*Distributed and Disparate Data*



# ORNL Intelligent Freight Initiative

*Solving a Critical Global Need for Authenticated  
Visibility of Security Sensitive Hazardous  
Materials & High Consequence Dangerous  
Goods Supply Chains  
ORNL PTS 015471*

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# The Global Supply Chain is Under Severe Duress



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# Border crossings take between 4 – 8 hours on average

- **Capacity Overload**
- Dated Infrastructure
- Globalization
- Environment
- Security



# Aging and failing infrastructure threaten supply chain efficiency

- Capacity Overload
- **Dated Infrastructure**
- Globalization
- Environment
- Security



# Global ports are operating over capacity

- Capacity Overload
- Dated Infrastructure
- **Globalization**
- Environment
- Security



# Epic natural disasters strain supply chain resources

- Capacity Overload
- Dated Infrastructure
- Globalization
- **Environment**
- Security



# 9/11 was a game changer

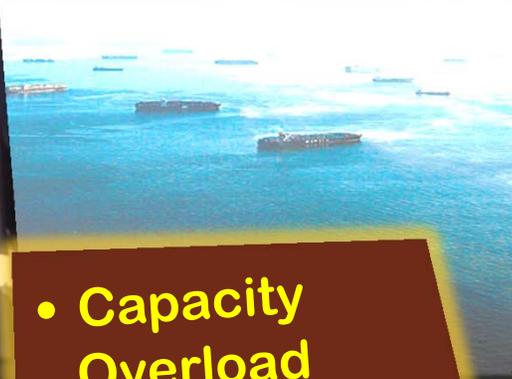
- Capacity Overload
- Dated Infrastructure
- Globalization
- Environment
- **Security**



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The pessimist sees difficulty in every opportunity. The optimist sees opportunity in every difficulty"

Winston Churchill



- Capacity Overload
- Dated Infrastructure
- Globalization
- Environment
- Security



# "Ad Hoc" Evolution of a Multi-Modal Supply Chain

1880s

Beginning of National Transport Infrastructure Development

1930s

Predatory competition – No National Safety Requirements

1935

Federal Regulation of Industry in Safety/Economics

1960s

Interstate and Defense Highway System



1968

DOT Established

1970s

HazMat/Hazardous Substances Regulations



1980

Industry Economic Deregulation

1990s

Just In Time and Lean Manufacturing



1990s

Globalization of Supply Chain



2000s

9/11 and  
Homeland  
Security

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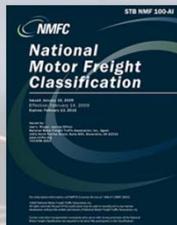
# No Integration of Freight & Product Taxonomy

1880s

Uniform Freight Classification Rail Ratemaking

1930s

Standard Transportation Commodity Code - Intermodal Ratemaking



1935

US Hazmat Regulations

1940s

National Motor Freight Classification-Motor Ratemaking

1970s

International Hazmat Regulations Harmonization

1980s

Uniform Product Code Adoption

1980s

"Freight all Kinds" Based Ratemaking

1980s

Electronic Data Interchange

1990s

Electronic Product Code

2000s

Security Sensitive  
Hazardous Materials



# Security Provides the Motivation to Act

9/11 Act

DOT

DHS

NRC

Security Sensitive Hazardous  
Materials (US) - *High Consequence*  
*Dangerous Goods (UN)*

Radioactive Materials in  
Quantities of Concern

National Source  
Tracking System  
Regulations

State/Local Law Enforcement, Commercial Industry, Commercial Carriers



# Conundrum: How to access trapped supply chain data

Established International Regulations



Deployed Technologies & Standards



**Trapped Supply Chain Information**

Multiple Federal Databases and Lists

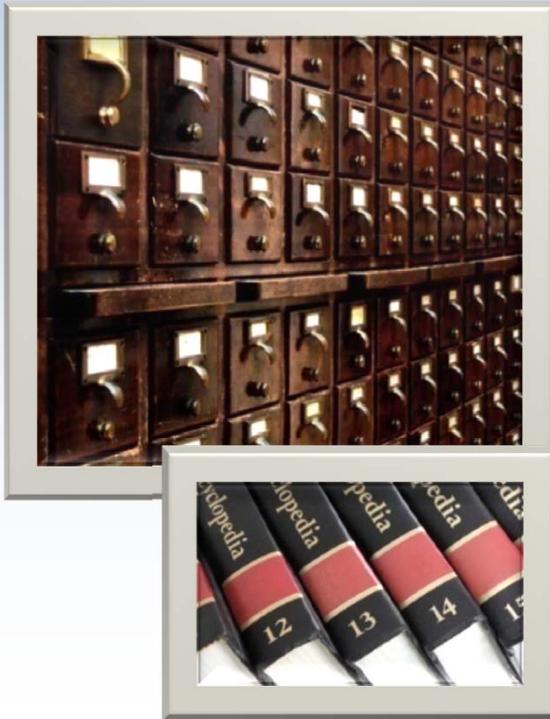


Recognized Proprietary Systems

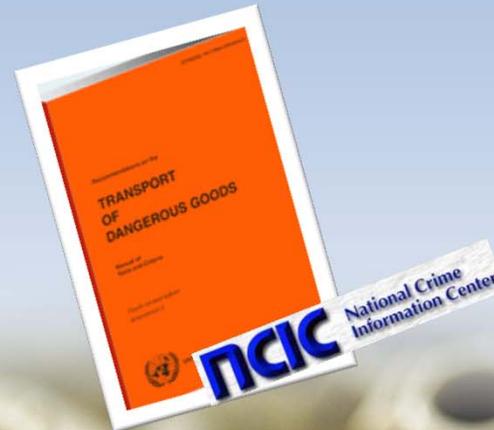


# World Wide Web = Instant Information

*“Internet: absolute communication, absolute isolation”. - Paul Carvel*

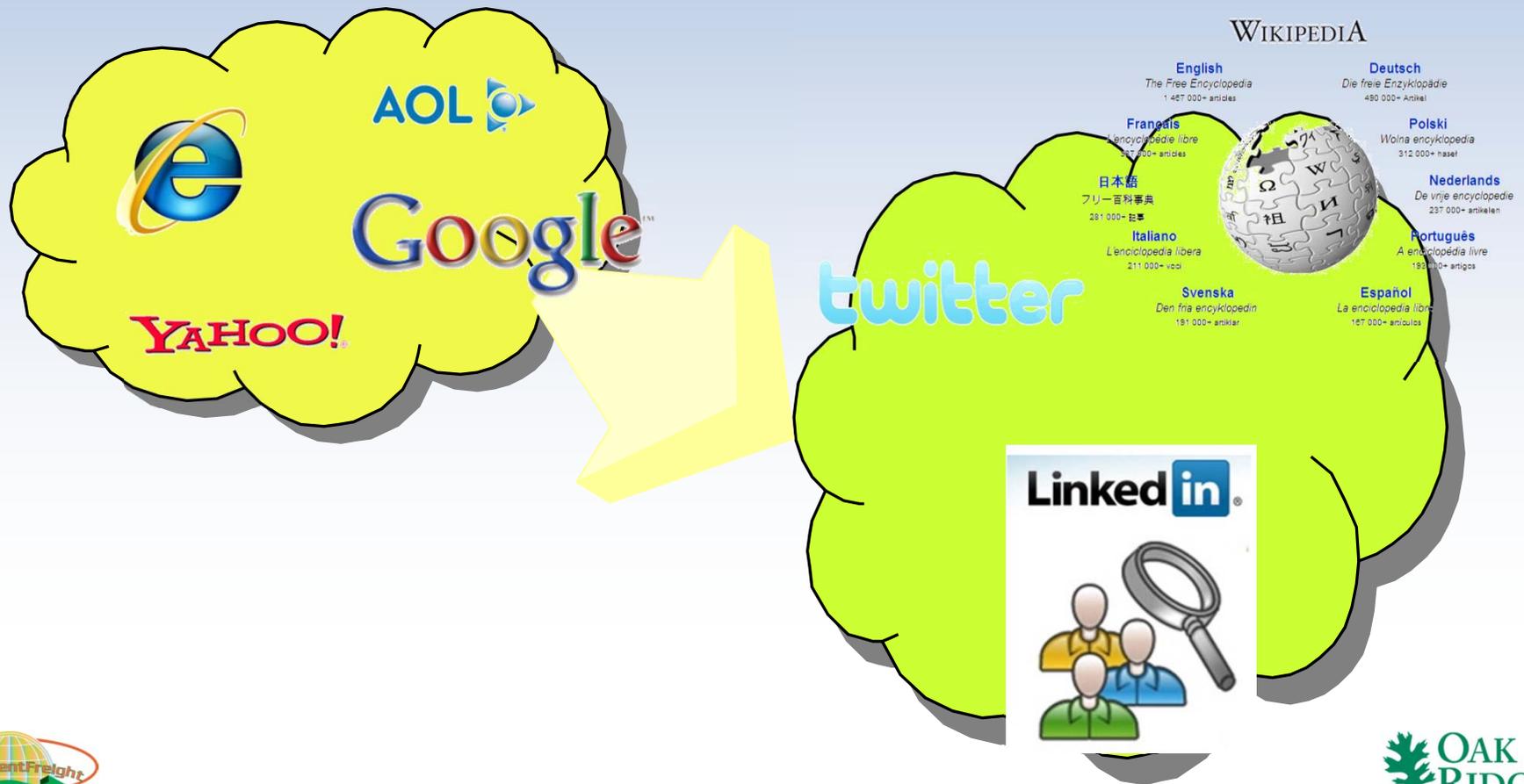


“It was impossible to get a conversation going; everybody was talking to much” *Yogi Berra*



# Web 2.0 = Information Sharing

*"I not only use all the brains I have, but all that I can borrow"* - Woodrow Wilson



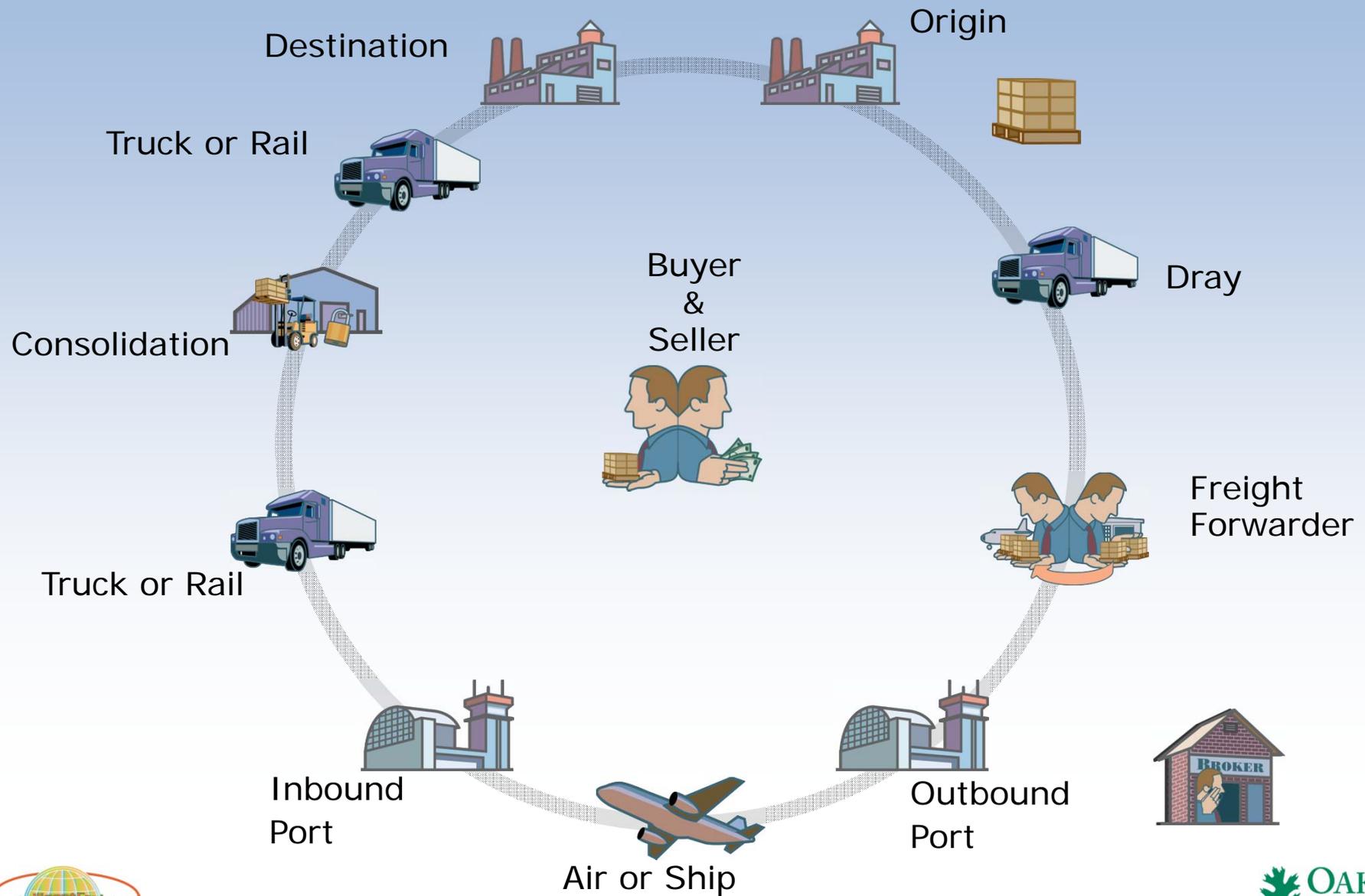
“Think like a wise man but  
communicate in the language  
of the people” - *William Butler Yeats*



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# The Global Supply Chain



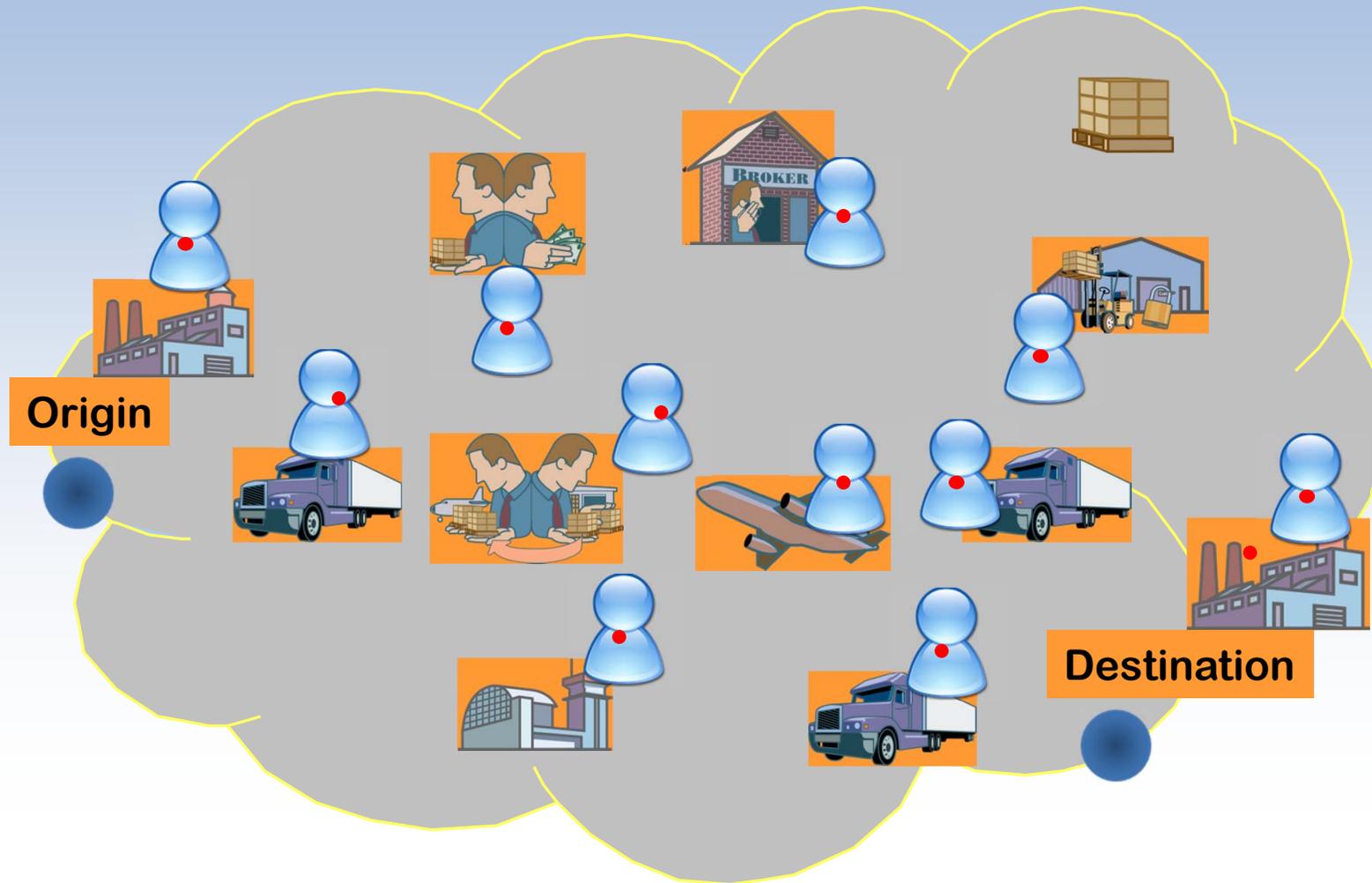
# Supply Chain Information Matrix is not Connected



## Information Matrix



# Formalize Web 2.0 Technologies to "Connect the Information Matrix Dots"



## Information Matrix



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# Users Add “Their Data Tags” to the Bucket

## Benefits:

- Low cost – Quick to market
- No Changes to Current Systems
- Popular, proven and intuitive

## Users:

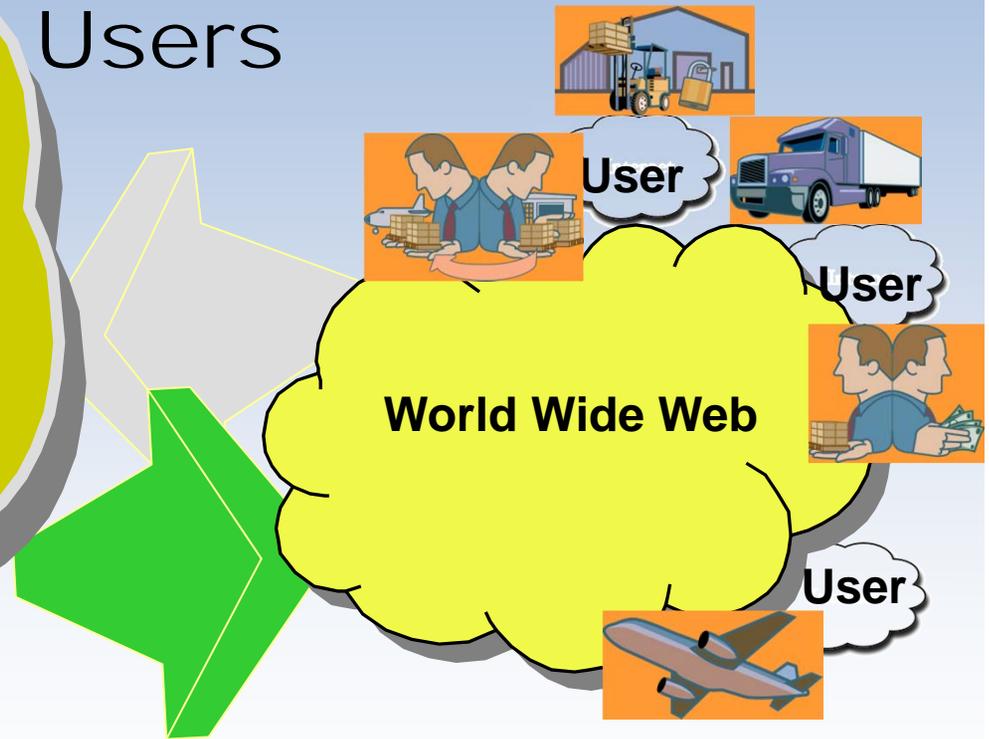
- Search with partial pieces of data
- Track using “own” information
- Archive granular product data



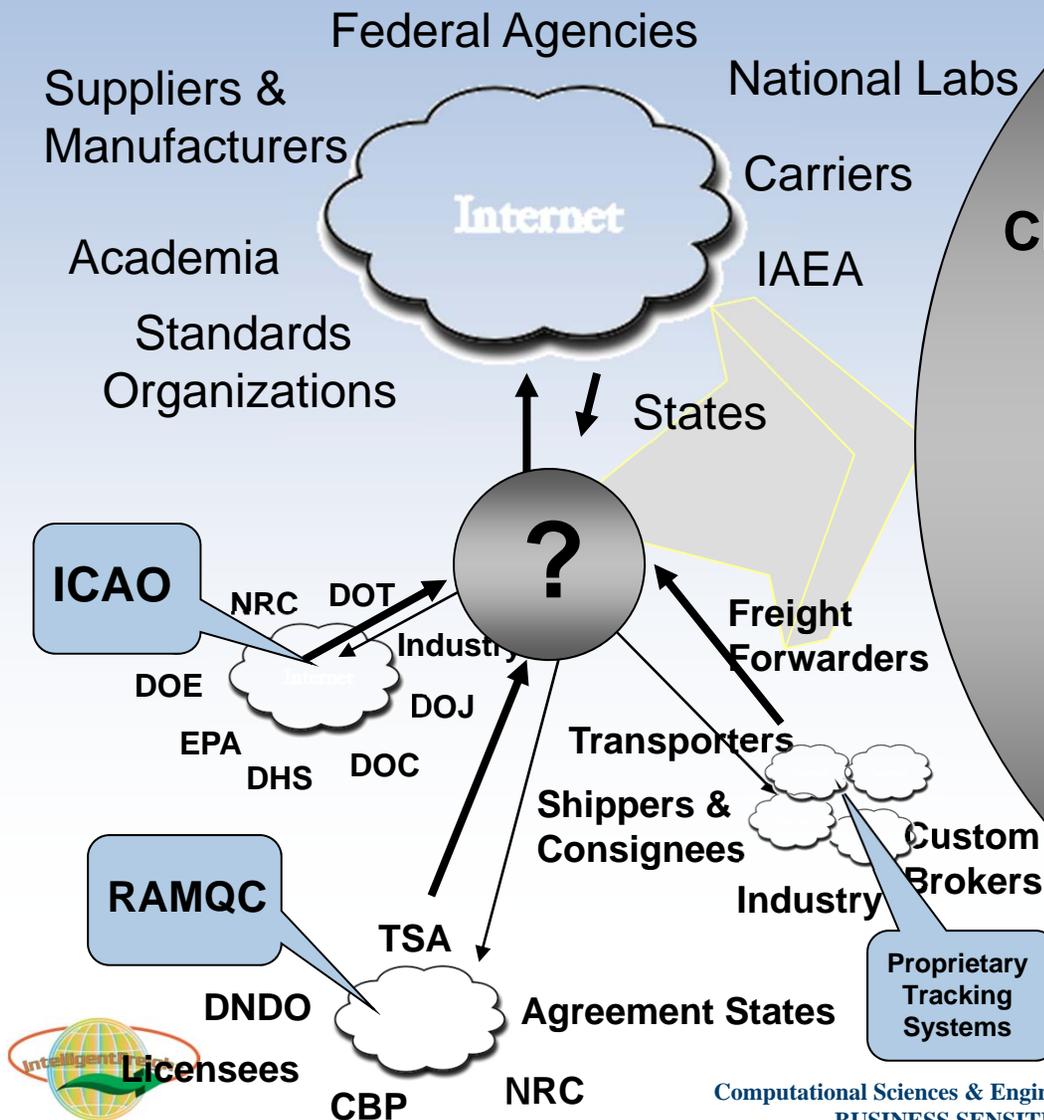
# Supply Chain Transparency for Authenticated Users

## Virtual Resource Indicator

- Unique Permanent Web ID
- Created on the Fly
- No Structured Database
- Technology Agnostic



# Start with Radioactive Materials in Quantities of Concern



## Why?

**Clear & Present Security Need**

**Not formalized by UN IAEA**

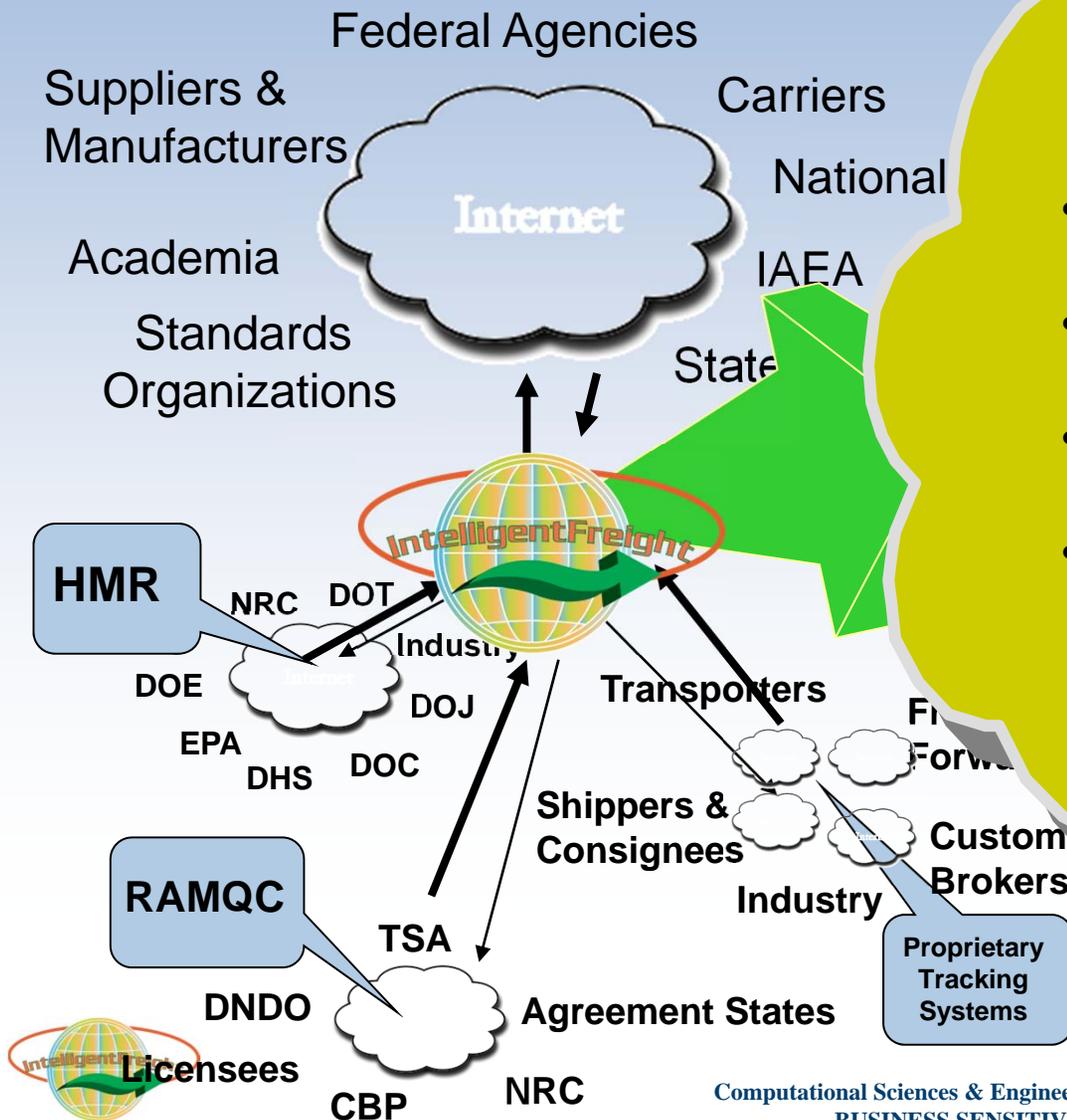
**No Commercial Interface**

**No Ubiquitous Sensing**

**No Existing Taxonomy**



# RAM Supply Chain Transparency



## Virtual Resource Indicator

- Location
- Exceptions
- Status
- Compliance



# What about Security?



## HACKERS CAN TURN YOUR HOME COMPUTER INTO A BOMB

By RANDY JEFFRIES / Weekly World News

**WASHINGTON** — Right now, computer hackers have the ability to turn your home computer into a bomb and blow you to Kingdom Come — and they can do it anonymously from thousands of miles away!

Experts say the recent "break-ins" that paralyzed the Amazon.com, Buy.com and eBay websites are tame compared to what will happen in the near future.

Computer expert Arnold Yabenson, president of the Washington-based consumer group National CyberCrime Prevention Foundation (NCCPF), says that as far as computer crime is concerned, we've only seen the tip of the iceberg.

"The criminals who knocked out those three major online businesses are the least of our worries," Yabenson told Weekly World News.

"There are brilliant but unscrupulous hackers out there who have developed technologies that the average person can't even dream of. Even people who are familiar with how computers work have trouble getting their minds around the terrible things that can be done.

"It is already possible for an assassin to send someone an e-mail with an innocent-looking attachment connected to it. When the receiver downloads the attachment, the electrical current and molecular structure of the central processing unit is altered, causing it to blast apart like a large hand grenade.

**... & blow your family to smithereens!**

**KABOOM!** It might not look like it, but an innocent home computer like this one can be turned into a deadly weapon.

"As shocking as this is, it shouldn't surprise anyone. It's just the next step in an ever-escalating progression of horrors conceived and instituted by hackers."

Yabenson points out that these dangerous sociopaths have already:

- Vandalized FBI and U. S. Army websites.
- Broken into Chinese military networks.
- Come within two digits of cracking an 17-digit Russian security code that would have sent deadly missiles hurtling toward five of America's major cities.

"As dangerous as this technology is right now, it's going to get much scarier," Yabenson said.

"Soon it will be sold to terrorists cults and fanatical religious-fringe groups.

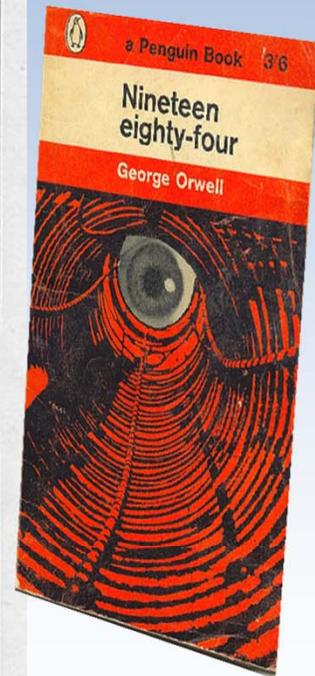
"Instead of blowing up a single plane, these groups will be able to patch into the central computer of a large airline and blow up hundreds of planes at once.

"And worse, this e-mail bomb program will eventually find its way into the hands of anyone who wants it.

"That means anyone who has a quarrel with you, holds a grudge against you or just plain doesn't like your looks, can kill you and never be found out."

**Sickos can wreak death and destruction from thousands of miles away!**

Arnold Yabenson.



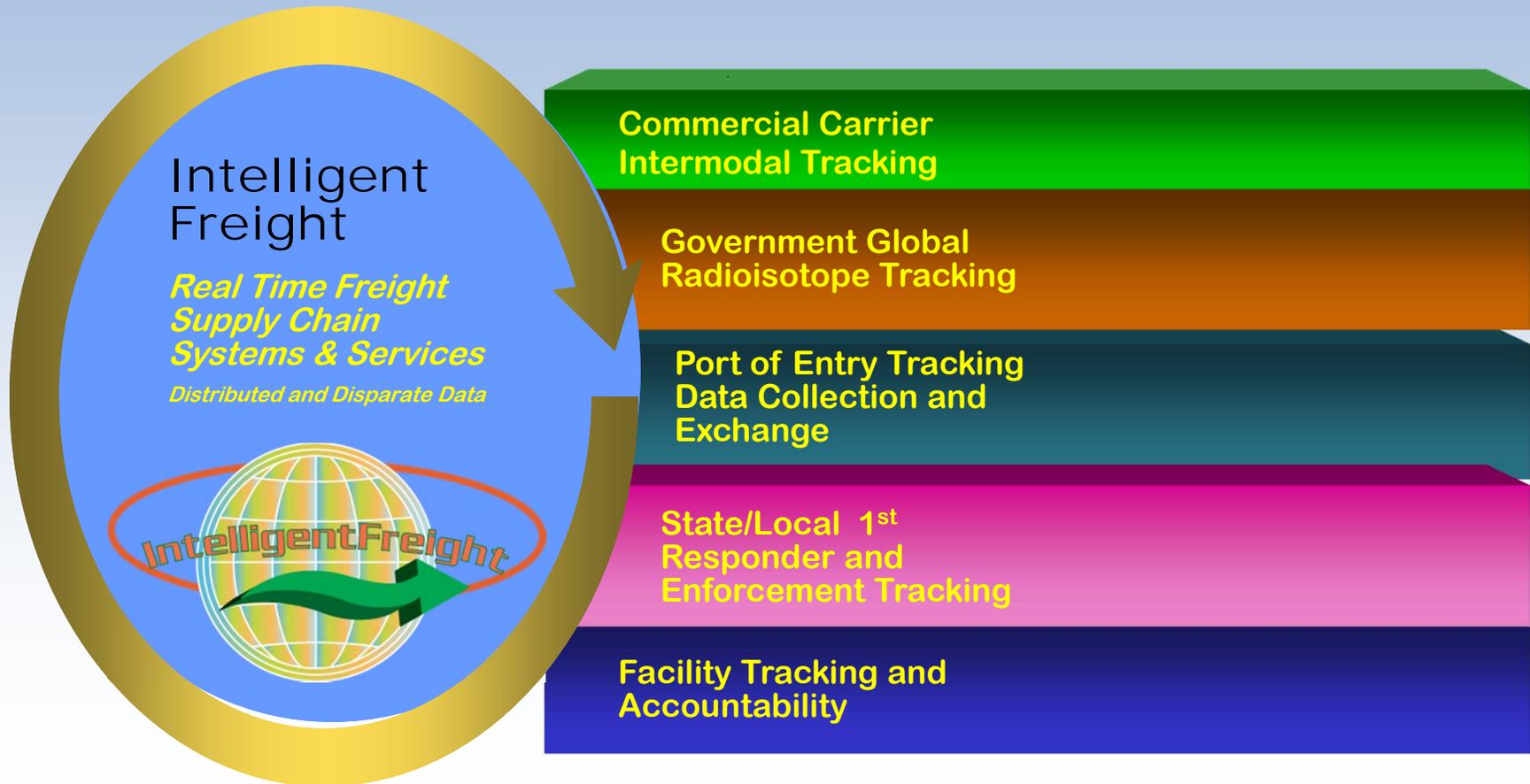
In God we trust. All others,  
we virus scan.



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# ORNL Supply Chain Testbeds



# International Testbed Opportunity



Government Global  
Radioisotope Tracking

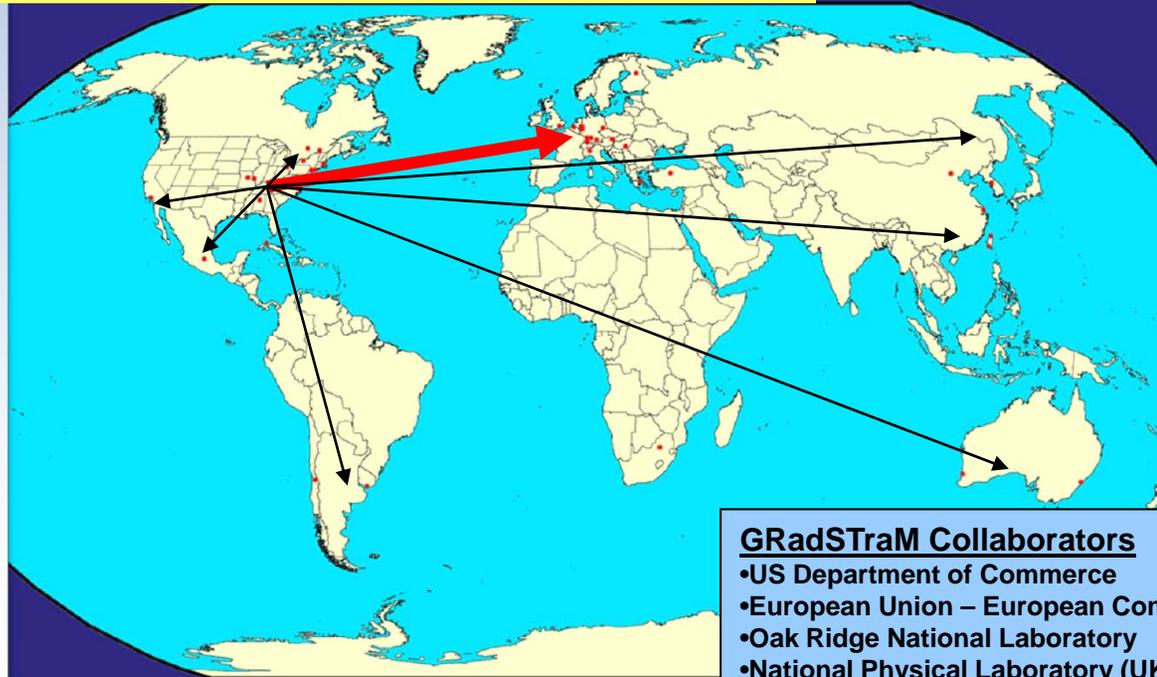


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# Global Radioisotope Sorting Tracking and Monitoring Prototype (GRadSTraM)

US-EU is developing a multi-modal transatlantic RAM tracking demo that will integrate Web 2.0, RFID and Faceted Classification Technologies.



*Example of DOE-ORNL Medical and Research isotope supply chain*

## GRadSTraM Collaborators

- US Department of Commerce
- European Union – European Commission
- Oak Ridge National Laboratory
- National Physical Laboratory (UK)
- US Environmental Protection Agency
- US Department of Energy
- US Postal Service
- Royal Mail



# 1<sup>st</sup> Responder Testbed Opportunity



State/Local 1<sup>st</sup>  
Responder and  
Enforcement Tracking

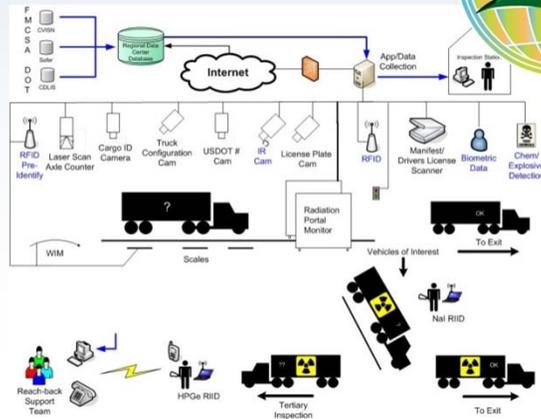


# Web 2.0 Enabled Inspection Decisions

Tennessee



Kentucky



South Carolina



# Wireless + Sensors + Legacy Databases + Web 2.0 = Supply Chain Visibility



Commercial Carrier  
Intermodal Tracking

Government Global  
Radioisotope  
Tracking

Port of Entry  
Tracking Data  
Collection and  
Exchange

State/Local 1<sup>st</sup>  
Responder and  
Enforcement Tracking

Facility Tracking and  
Accountability

Modeling, Prototyping, & Demonstrating

Web 2.0 Enabled Sensor Integrations

Commercialization



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Where did the first picture come from?





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# Questions



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