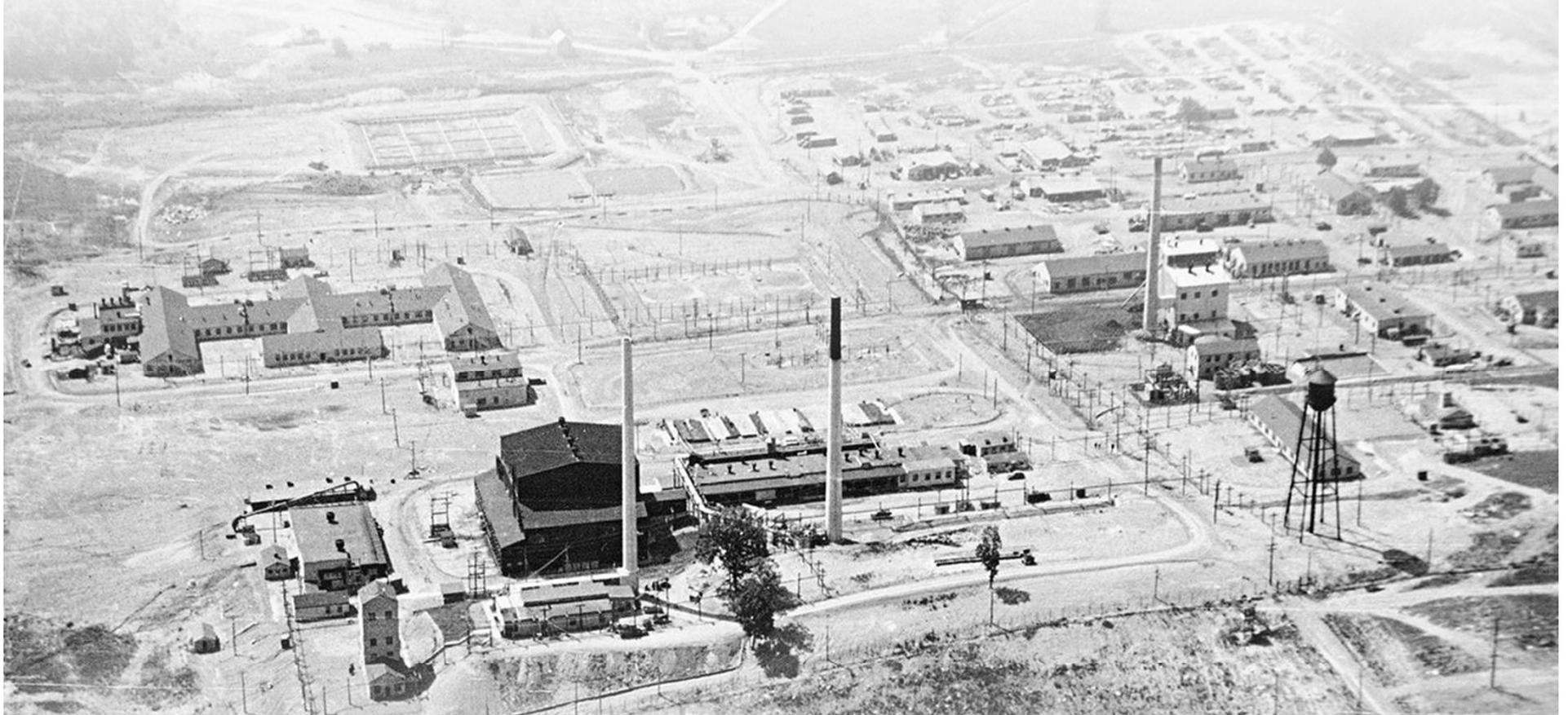


Next Generation Technologies for Securing Today's Supply Chain

Tracking 2.0

Presented to :
TSA Multi-Modal Meeting
Tallahassee, Florida
May 12, 2011
by
Randy Walker
Oak Ridge National Laboratory
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Oak Ridge National Laboratory evolved from the Manhattan Project



ORNL in 1943
The Clinton Pile was the world's first continuously operated nuclear reactor

Today, ORNL is DOE's largest science and energy laboratory

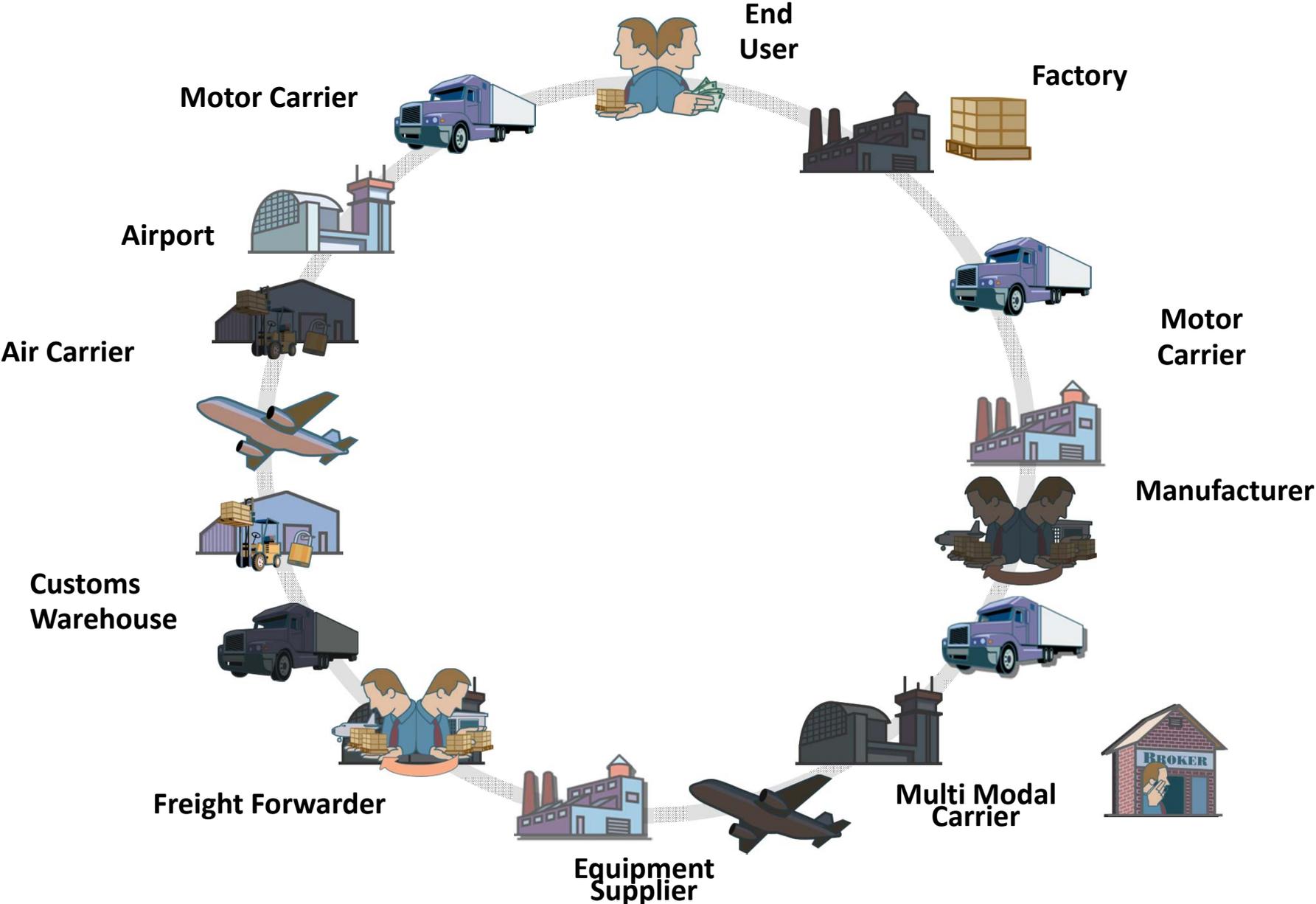


- **\$1.3B budget**
- **4,350 employees**
- **3,900 research guests annually**
- **\$350 million invested in modernization**
- **World's most powerful open scientific computing facility**
- **Nation's largest concentration of open source materials research**
- **Nation's most diverse energy portfolio**
- **Operating the world's most intense pulsed neutron source**
- **Managing the billion-dollar U.S. ITER project**

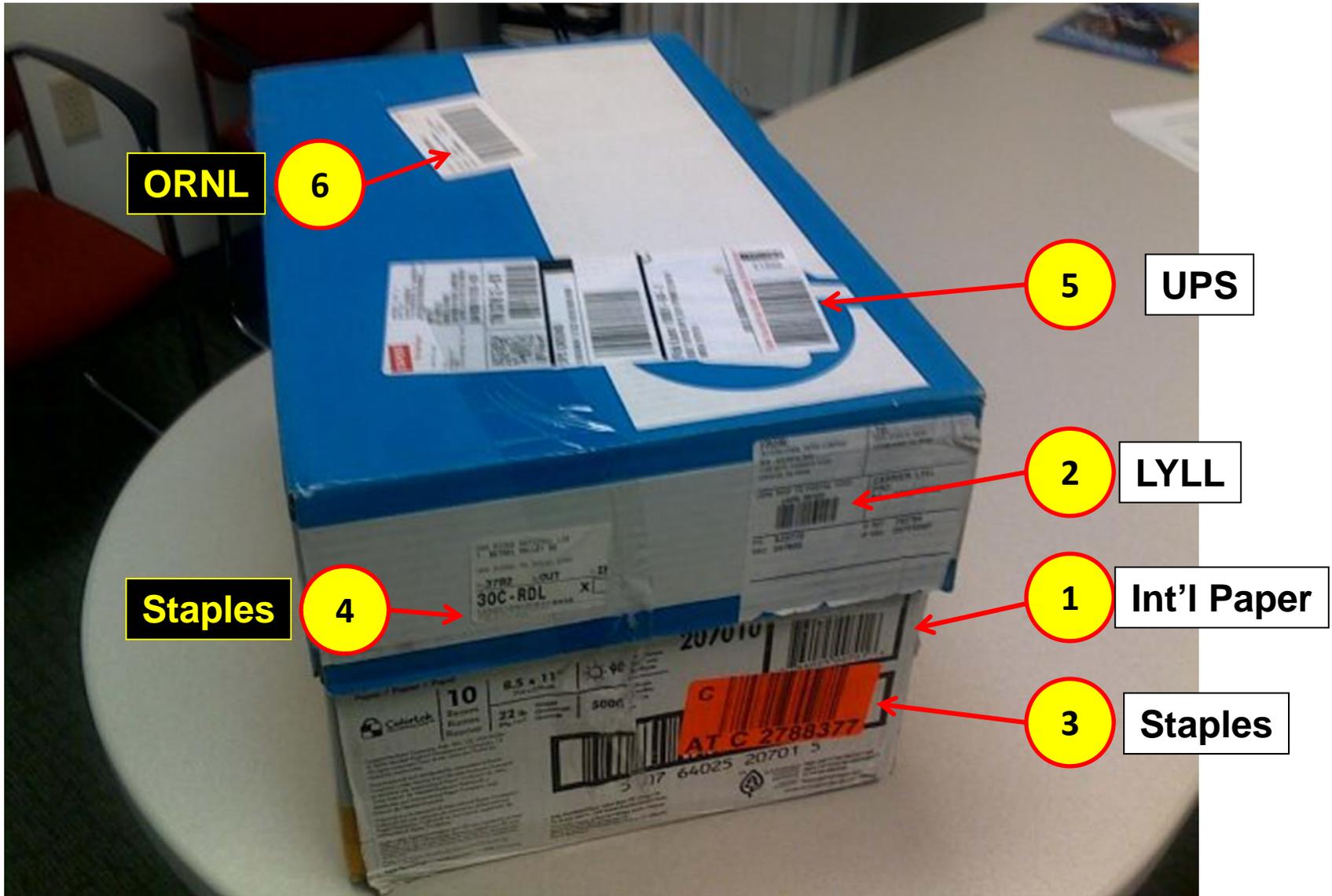
ORNL is Focusing Next Generation Tracking Technologies on the Supply Chain



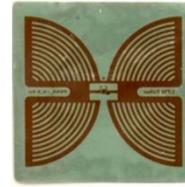
Our supply chain is not connected



Lots of tracking, but no end-to-end visibility



Tracking Technology: A Moving Target

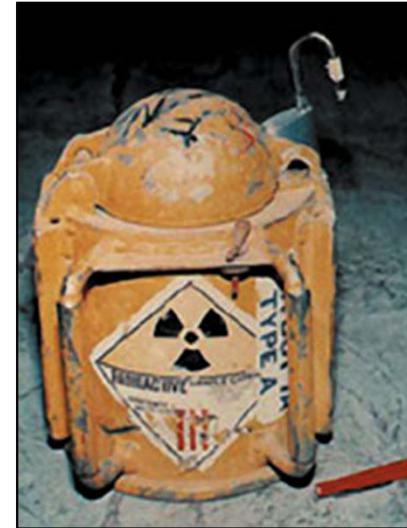


EPA's & DOE's Dilemma

60 high-risk radioactive sources were lost or stolen between 1994 and 2005, with an average of one per year not recovered

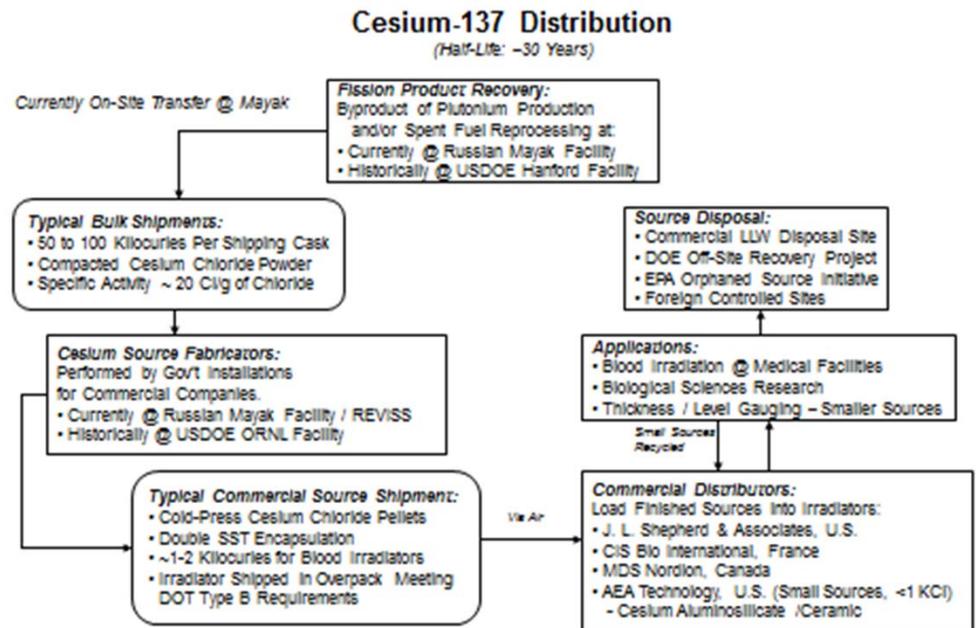
Between 1999 and 2005, the Department of Energy recovered 12,024 sources that were considered vulnerable or at a high-risk for theft or misuse

An average of about 300 sources of all types are reported lost or stolen each year

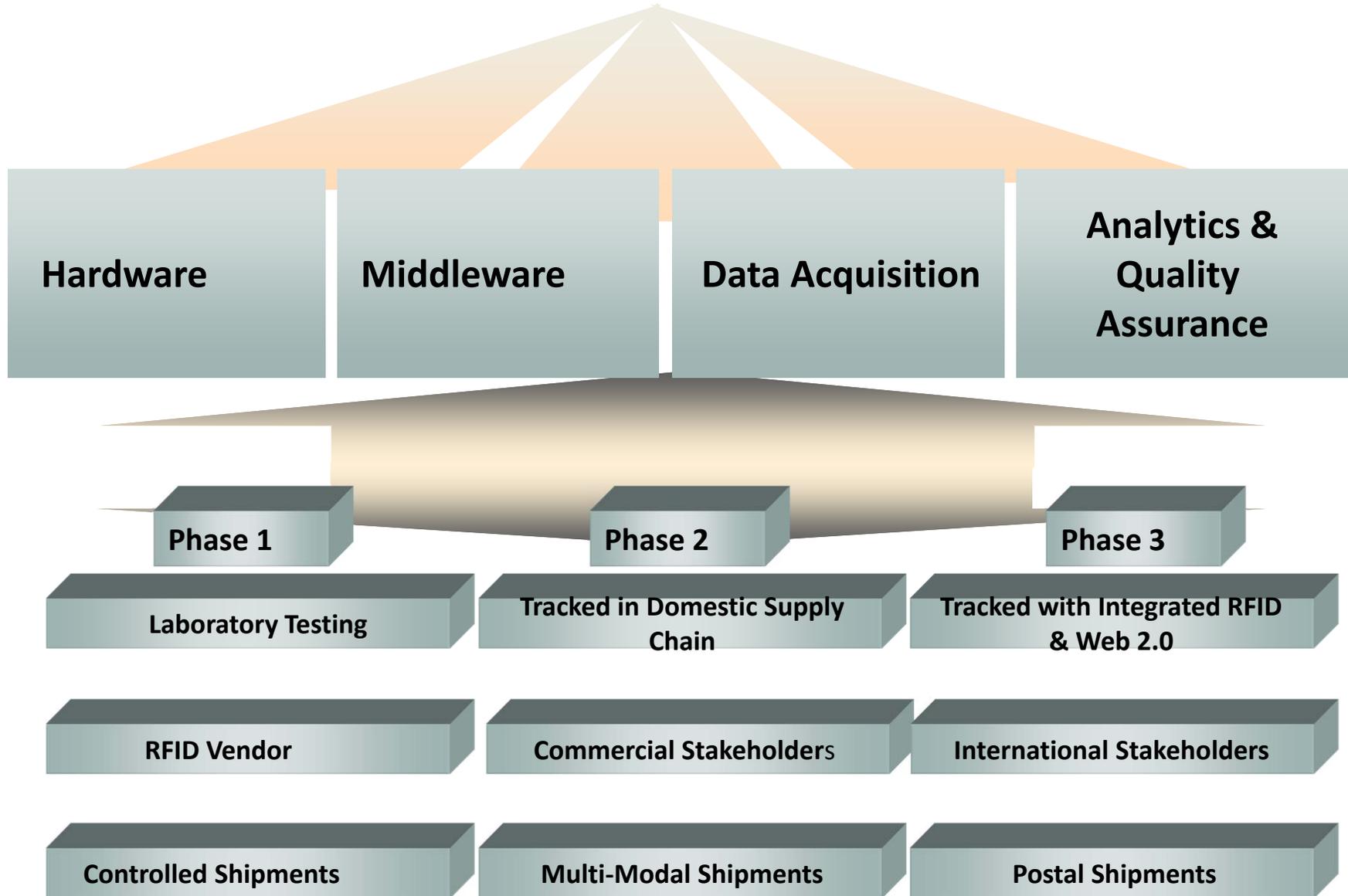


RadSTraM Project

- To meet the goal of reducing incidence of orphan sources, EPA began investigating Tracking Technologies
- EPA established an interagency agreement with DOE and the Oak Ridge National Laboratory
- The project was called Radiological Source Tracking and Monitoring (RadSTraM)



RadSTraM was Performed in Three Phases



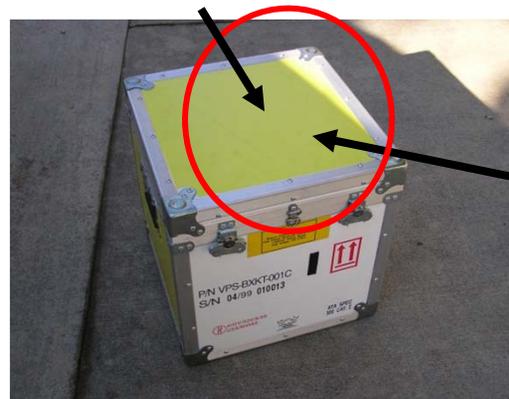
RadSTraM Phase I

RFID Sensors embedded in Type A Radioactive Material packages

Radiation monitors at a Tennessee State weigh station were also employed



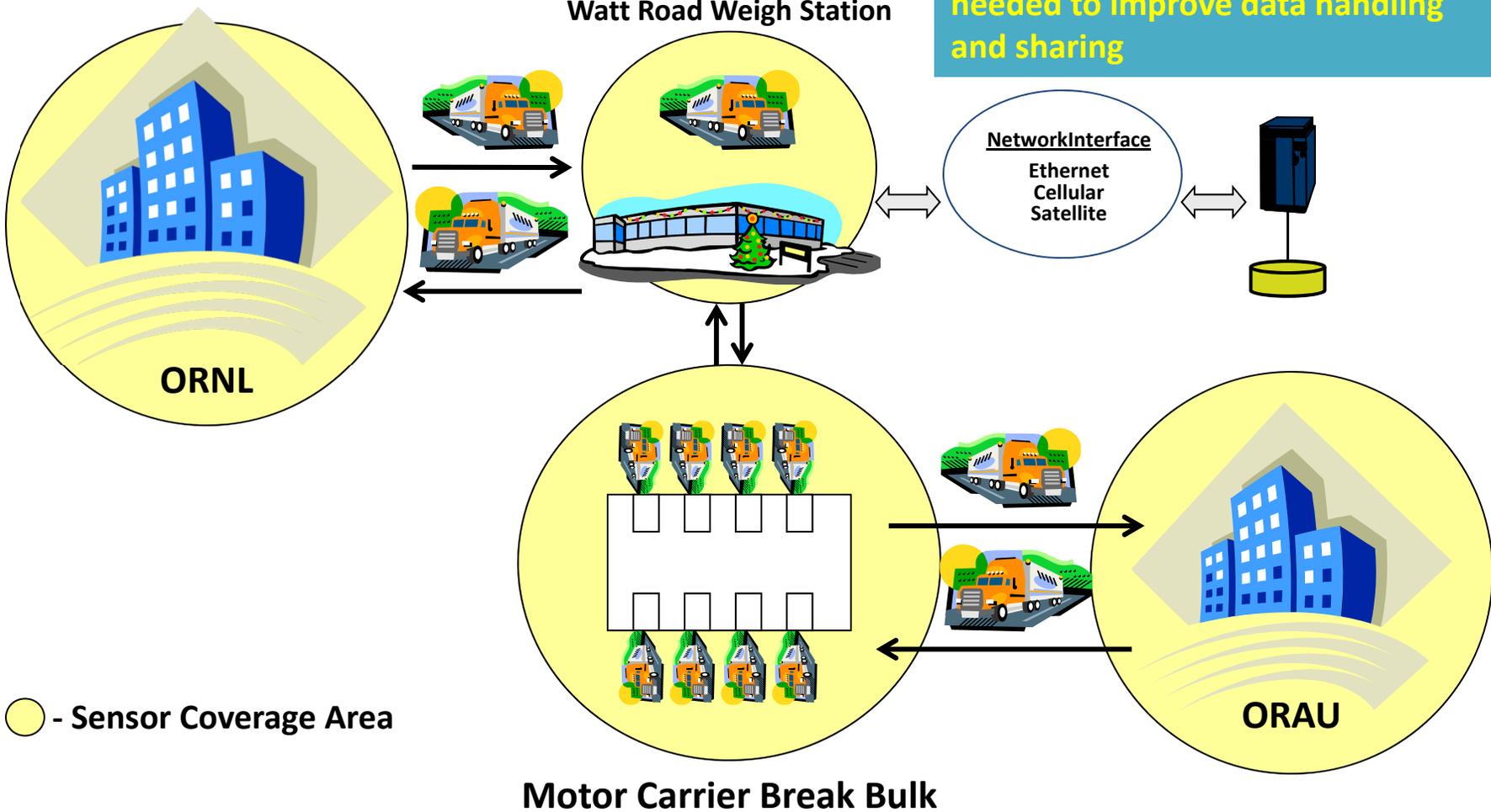
Electronic Seal



Remote Sensor

Phase I Controlled Environment "In Commerce" Test

The hardware concept proved valid, but a central database was needed to improve data handling and sharing



RadSTraM: Phase II

- Used procedures, protocols, lessons learned from Phase I
- Shipped medical radioisotopes between a commercial facility (Massachusetts) and ORNL (Tennessee)
- Used a combination of express air and truck



RadSTraM Phase II

Perkin Elmer Boston

RFID Readers



DHL Boston



Used three different RFID Sensor Vendors.

RFID sensors worked but were not ubiquitous

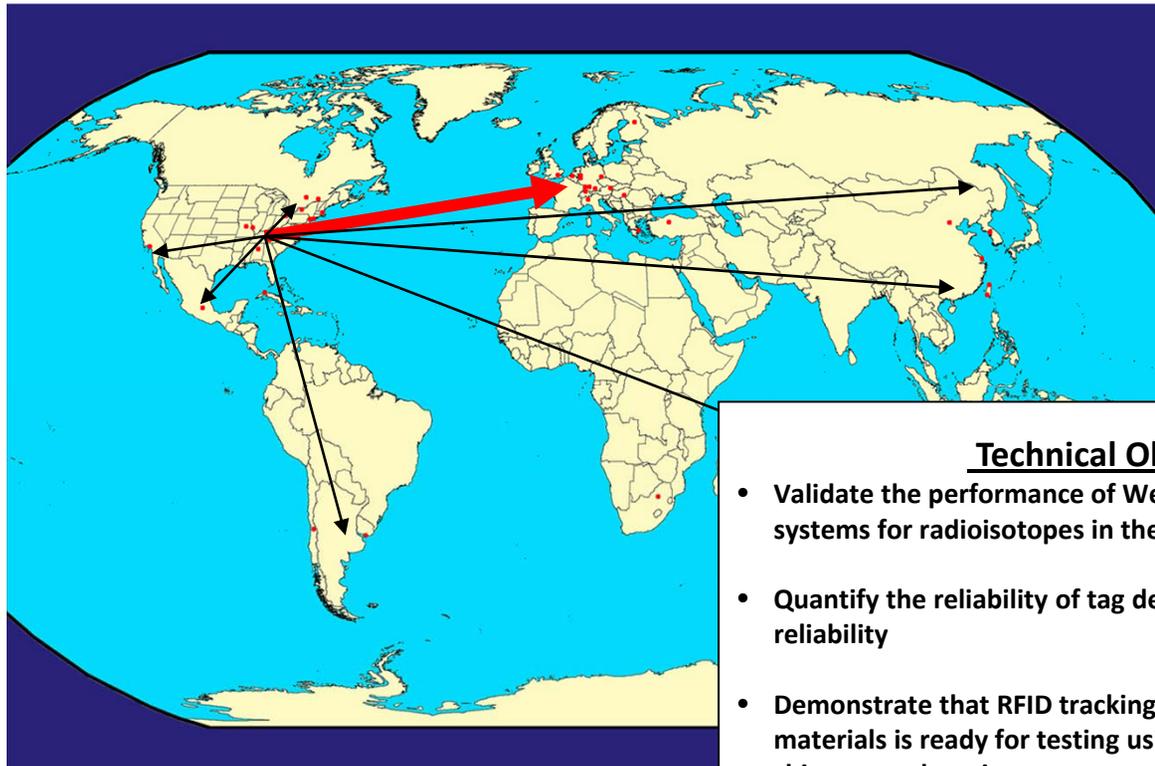
EPA RadSTraM: Phase III

- Objective: To further develop and test the integration of hardware and software using emerging Web 2.0 technology
- Project selected by the U.S. Department of Commerce (DOC) and the European Union to be part of an international demonstration project for RFID development
 - Thus became part of Phase I of the Global Radiological Source Tracking and Monitoring (GRadSTraM) Project



GRadSTraM and Global Tracking 2.0

Using Web 2.0 principles to track radioisotope shipments across multiple proprietary and commercial sensor technologies internationally



Example of DOE-ORNL Medical and Research isotope supply chain

Technical Objectives:

- Validate the performance of Web 2.0-enabled RFID tracking systems for radioisotopes in the international supply chain
- Quantify the reliability of tag detection and operational reliability
- Demonstrate that RFID tracking and monitoring of radioactive materials is ready for testing using commercial radioisotope shippers and carriers
- Demonstrate information security using a faceted classification system architecture

What is Tracking 2.0?

Tracking 2.0 is a term ORNL has coined to describe the use of social media concepts and Web 2.0 principles to provide location tracking services to supply chain management applications.

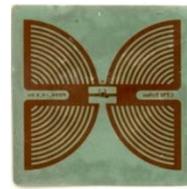


Social Media Principles

What are the underlying social media principles in ORNL's Tracking 2.0 applications?

The Ubiquitous, All-Purpose URL

In Tracking 2.0, all codes translate to URLs that point to tracking information



FedEx Tracking Number

<http://www.fedex.com/Tracking?tracknumbers=39827516310000049859670463312017>

UPS Tracking Number

<http://www.ups.com/WebTracking/processInputRequest?tracknum=1Z19Y76W0242363365>

DOD Cage Code

<http://www.bpn.gov/bincs/choose.asp?cage=77272>

DOD Part Number

http://www.dlis.dla.mil/webflis/pub/pub_search.aspx?Par=True&part=414VS806-6

DOD National Stock Number

http://www.dlis.dla.mil/webflis/pub/pub_search.aspx?niin=1680011237643

Networked Device Mac Address

http://www.coffer.com/mac_find/?string=

Principle 1: The Ubiquitous, All-Purpose URL

A screenshot of a YouTube video player. The video title is "Tsunami in Thailand". A yellow box highlights the URL: <http://www.youtube.com/watch?v=w9yYqj4rVM>. The video player shows a scene of a beach with palm trees and a building. The video has 3,616 ratings and 4,349,959 views. The page includes navigation links like Home, Subscriptions, Videos, Shows, Channels, and a search bar.

A screenshot of the FedEx website's tracking page. The URL https://www.fedex.com/AltRefTracking?cntry_code=us/ is highlighted in a yellow box. The page features a "Track" section with a photo of a FedEx delivery van. Below the photo, there are several tracking options: "Track by E-mail", "Obtain Signature Proof of Delivery", "FedEx Desktop", "My FedEx", "TCN", "FedEx InSight", "FedEx Trade Networks", and "FedEx Wireless Solution".

<http://www.npr.org/templates/player/mediaPlayer.html?action=1&t=1&islist=false&id=111758901&m=111764515>

A screenshot of a Wikipedia article titled "United States Department of Energy". The URL http://en.wikipedia.org/wiki/United_States_Department_of_Energy is highlighted in a yellow box. The article includes a globe icon and navigation links like "article", "discussion", "edit this page", and "history".

http://en.wikipedia.org/wiki/United_States_Department_of_Energy

A screenshot of the United States Department of Energy website. The page features the department's seal and a navigation menu with links like "Main page", "Contents", "Featured content", "Current events", and "Random article". There is also a search bar and an "interaction" section with links to "About Wikipedia" and "Community portal".



A snippet of a news article titled "Eunice Shriver, Special Olympics Founder, Dies". The text states: "Eunice Kennedy Shriver, the younger sister of President John F. Kennedy, has died at the age of 88. Shriver continued to advocate for people with mental retardation." Below the text is a small icon for "Champion For Developmentally Disabled" and a "On Morning Edition" link.

Two snippets of news articles from NPR. The first is titled "Productivity Jumps as Labor Costs Dive" and mentions a nearly six-year high pace in the second quarter. The second is titled "McChrystal: Give Taliban Fighters A Political Voice" and mentions that the U.S. general says the average Taliban fighter is not ideologically driven. Both snippets include "On Morning Edition" links.

An advertisement for the NPR shop. It features a photo of an "ETON G6 BUZZ ALDRIN SPECIAL EDITION RADIO" and the text: "A celebration of America's 50 years of space exploration." There is also a "shop" button and a "Visit the NPR SHOP" link.

Principle 2: Social Networking

A wants an introduction to B



The “Six Degrees of Separation”

A and B belong to a social network



Digital Social Networking

Web 2.0 reveals the “loose links” between A to B

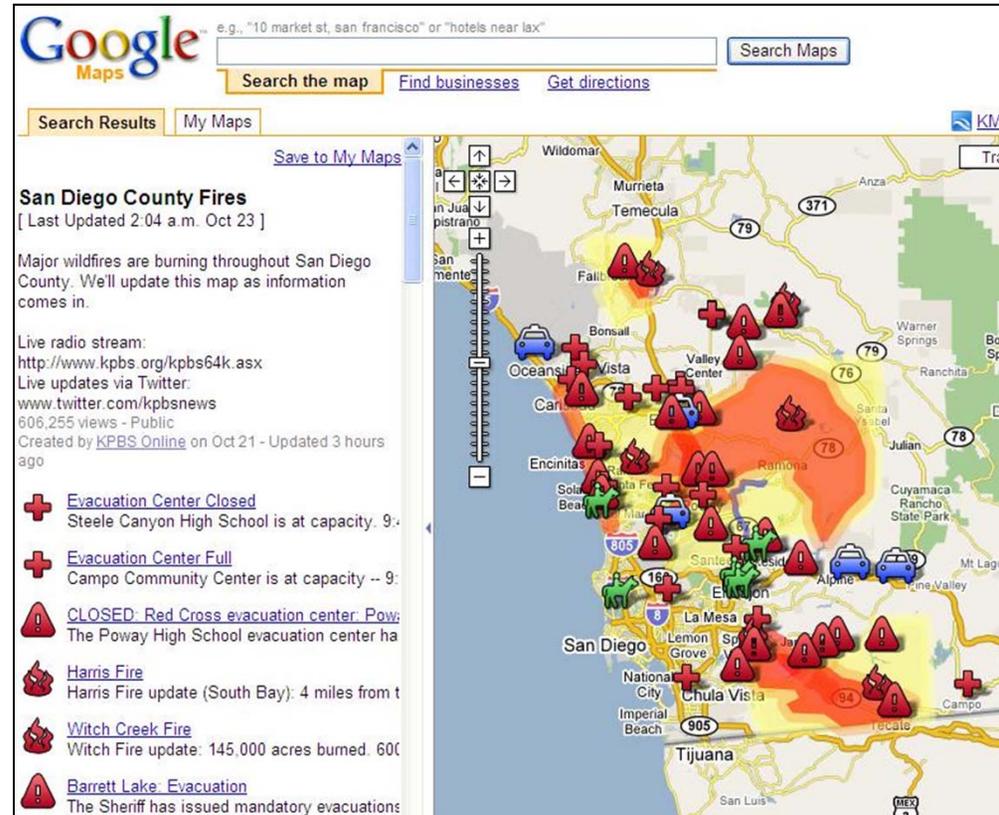


Principle 3: Tags and Mashups

Finding and Showing Information

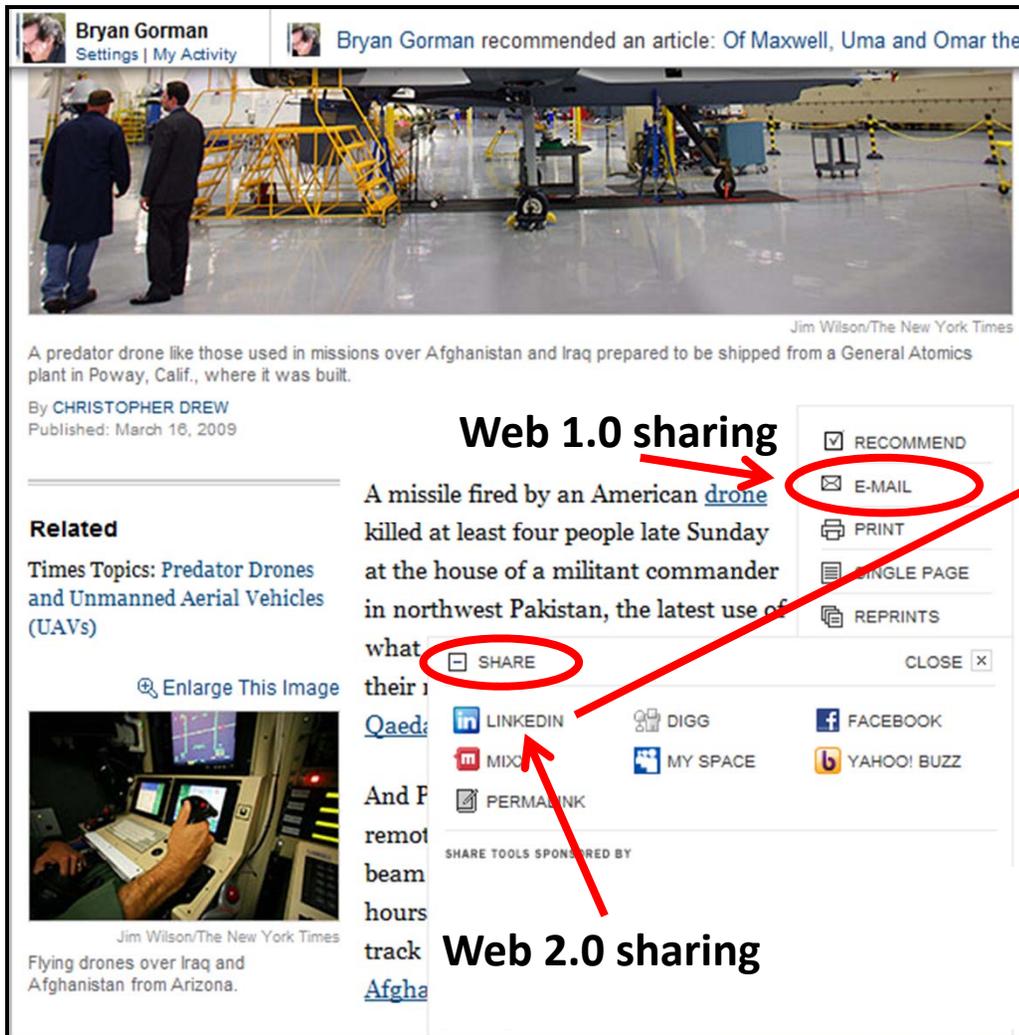
A **tag** adds labels to help locate and organize data (photographs, video, observations, and websites)

A **mashup** combines data from two or more sources into a single integrated view



Web 2.0: Combining URLs and Social Networks

NY Times Article



Bryan Gorman
Settings | My Activity

Bryan Gorman recommended an article: Of Maxwell, Uma and Omar the



Jim Wilson/The New York Times

A predator drone like those used in missions over Afghanistan and Iraq prepared to be shipped from a General Atomics plant in Poway, Calif., where it was built.

By CHRISTOPHER DREW
Published: March 16, 2009

Web 1.0 sharing

- RECOMMEND
- E-MAIL
- PRINT
- SINGLE PAGE
- REPRINTS

Web 2.0 sharing

- SHARE
- LINKEDIN
- DIGG
- FACEBOOK
- MIX
- MY SPACE
- YAHOO! BUZZ
- PERMALINK

SHARE TOOLS SPONSORED BY

Related

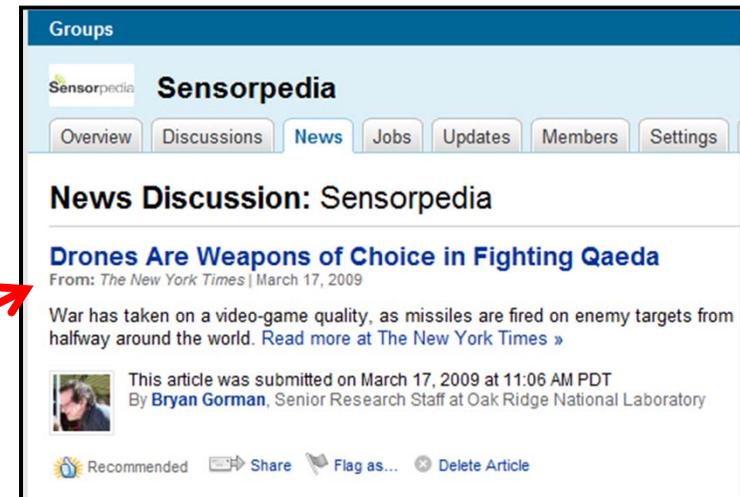
Times Topics: [Predator Drones and Unmanned Aerial Vehicles \(UAVs\)](#)



Jim Wilson/The New York Times

Flying drones over Iraq and Afghanistan from Arizona.

LinkedIn Study Group



Groups

Sensorpedia

Overview Discussions News Jobs Updates Members Settings

News Discussion: Sensorpedia

Drones Are Weapons of Choice in Fighting Qaeda
From: The New York Times | March 17, 2009

War has taken on a video-game quality, as missiles are fired on enemy targets from halfway around the world. [Read more at The New York Times »](#)

 This article was submitted on March 17, 2009 at 11:06 AM PDT
By [Bryan Gorman](#), Senior Research Staff at Oak Ridge National Laboratory

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Web 2.0: Combining Mashups and Social Networks

 Melanie McCown Sanders likes this.

Write a comment...

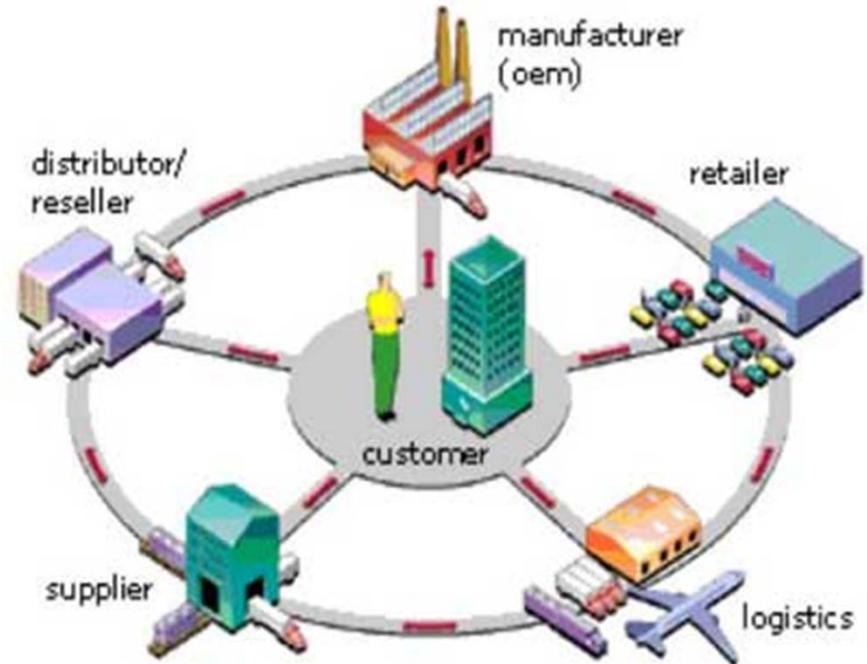
 **John Q. Public** ✕

 **Oak Ridge National Laboratory**
Jay just checked in @ Oak Ridge National Laboratory (Oak Ridge, Tennessee)
foursquare

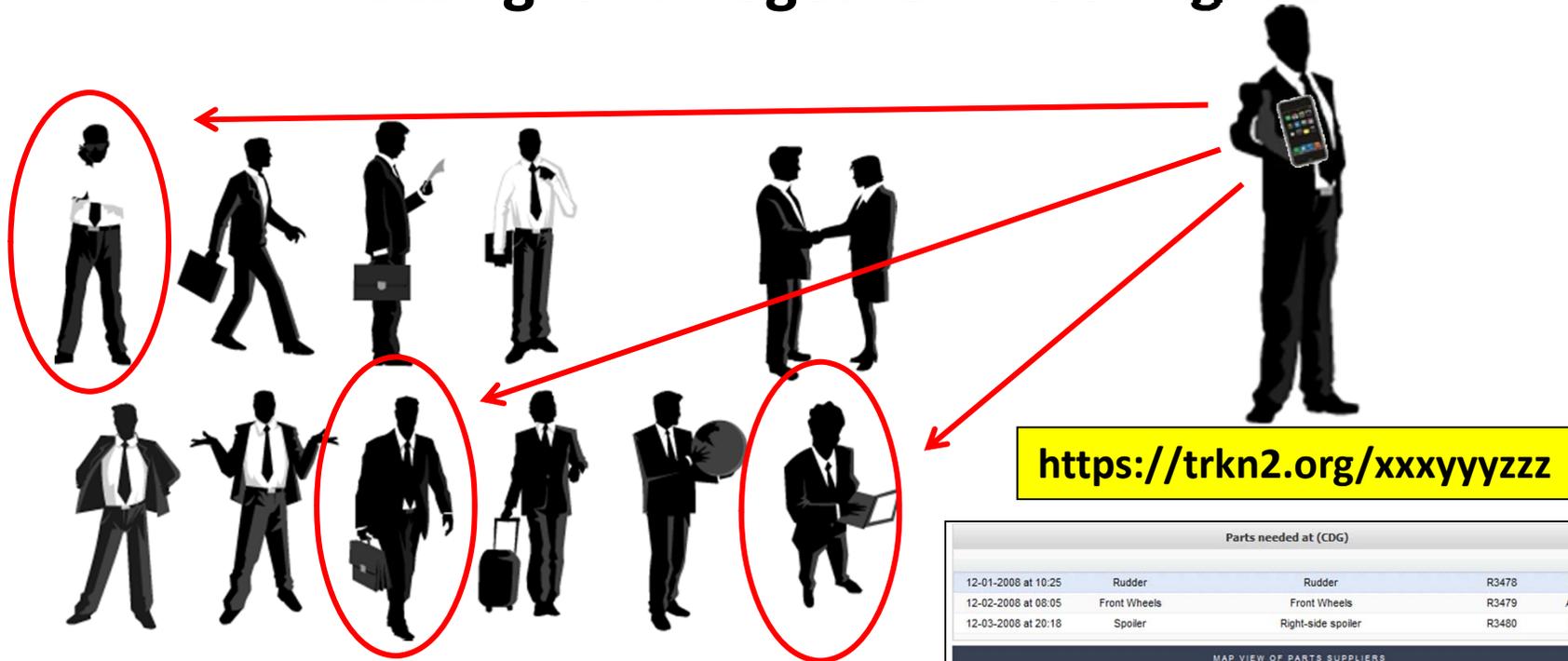
 April 13 at 7:35am via Foursquare · Like · Comment · Jay on foursquare

Social Networking for Enterprise Asset Tracking

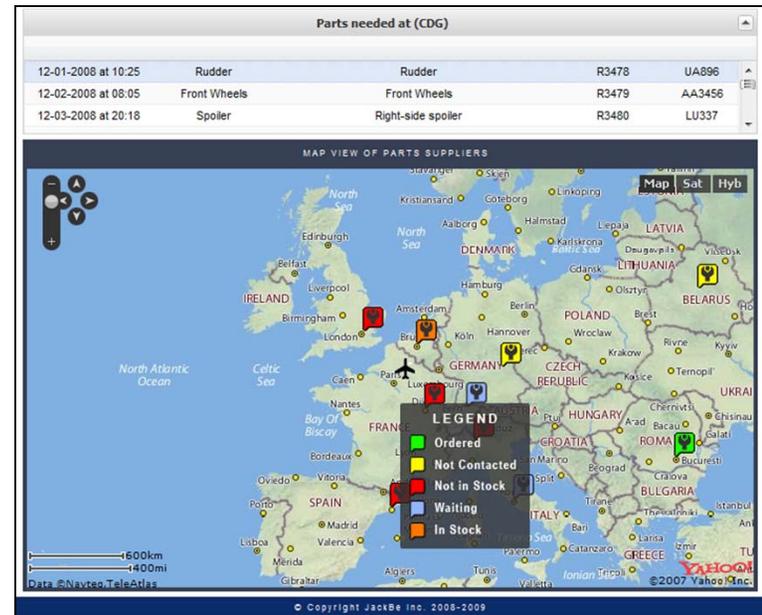
Just as a social network web site makes the “six degrees of separation” amongst its members visible and accessible, a Tracking 2.0 web site provides similar access and visibility for its users, systems, and items to meet an enterprise’s asset tracking requirements.



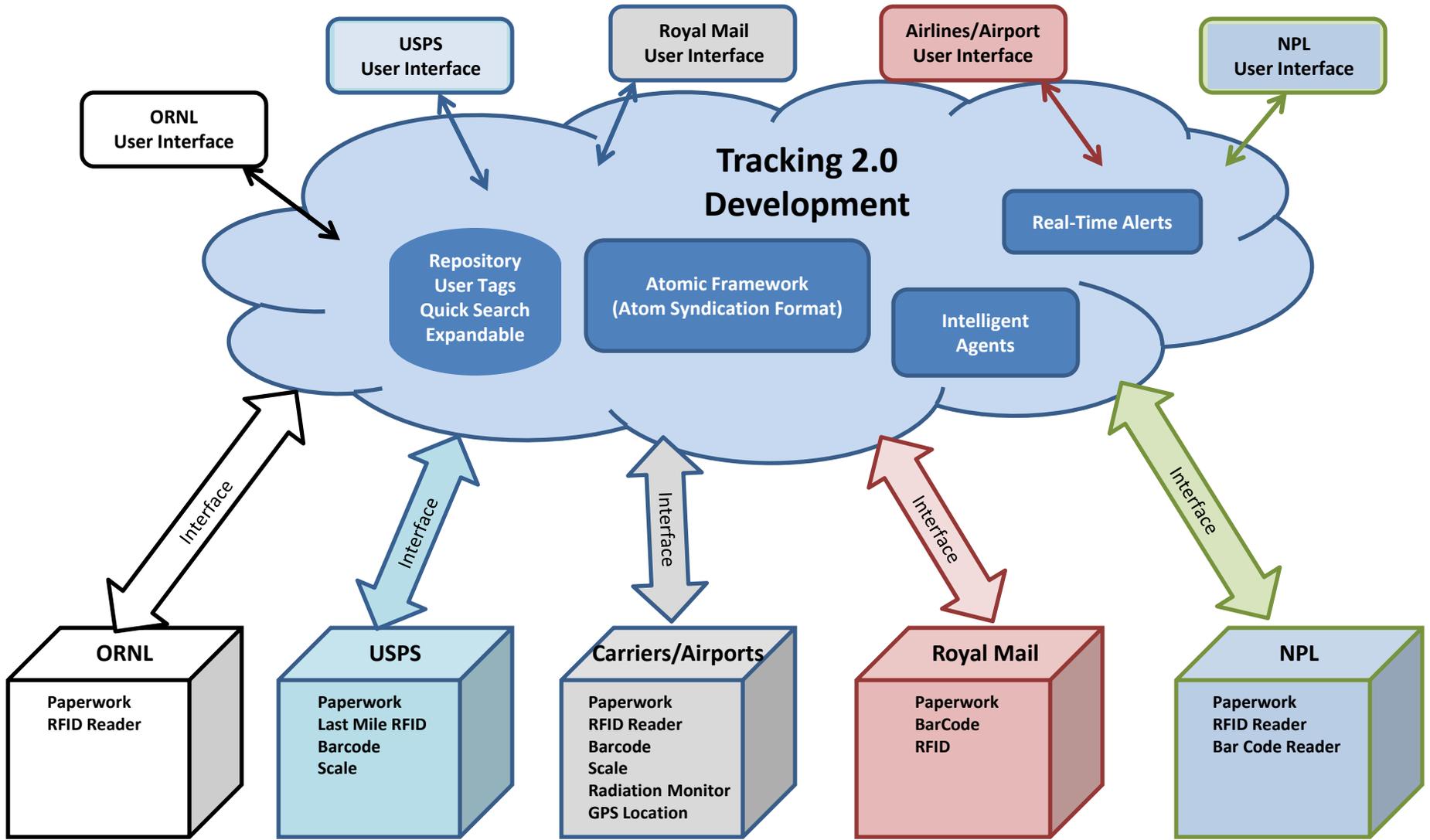
Putting it All Together: Tracking 2.0



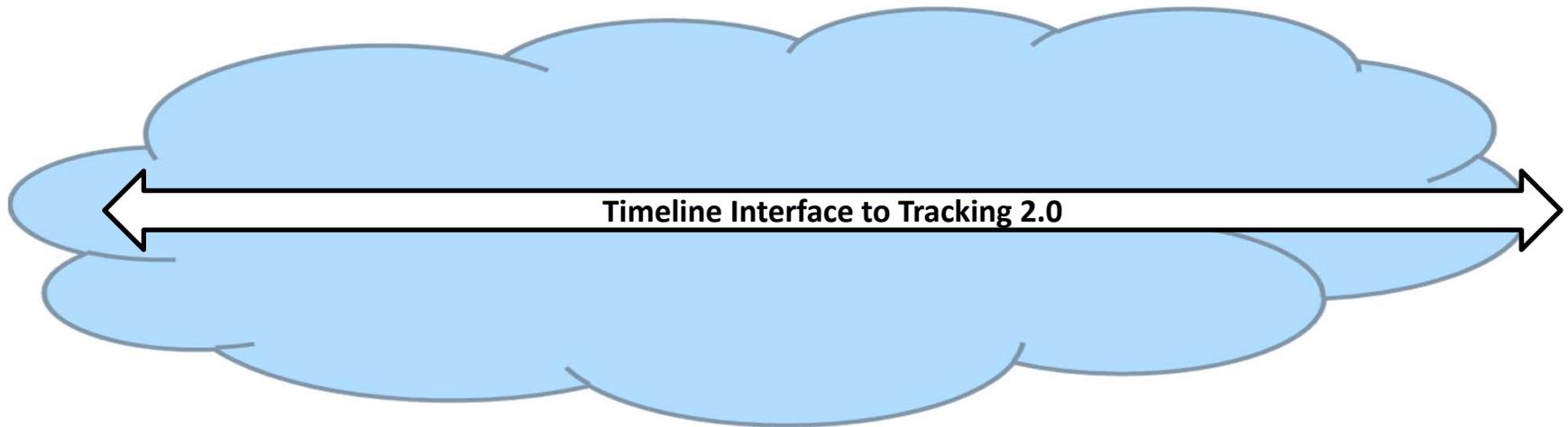
By adapting ORNL's Tracking 2.0 methods, government and industrial partners can demonstrate how URLs, social networking, link sharing, geo-tagging and mashups will enhance and improve the security of enterprise, national, and global supply chain networks.



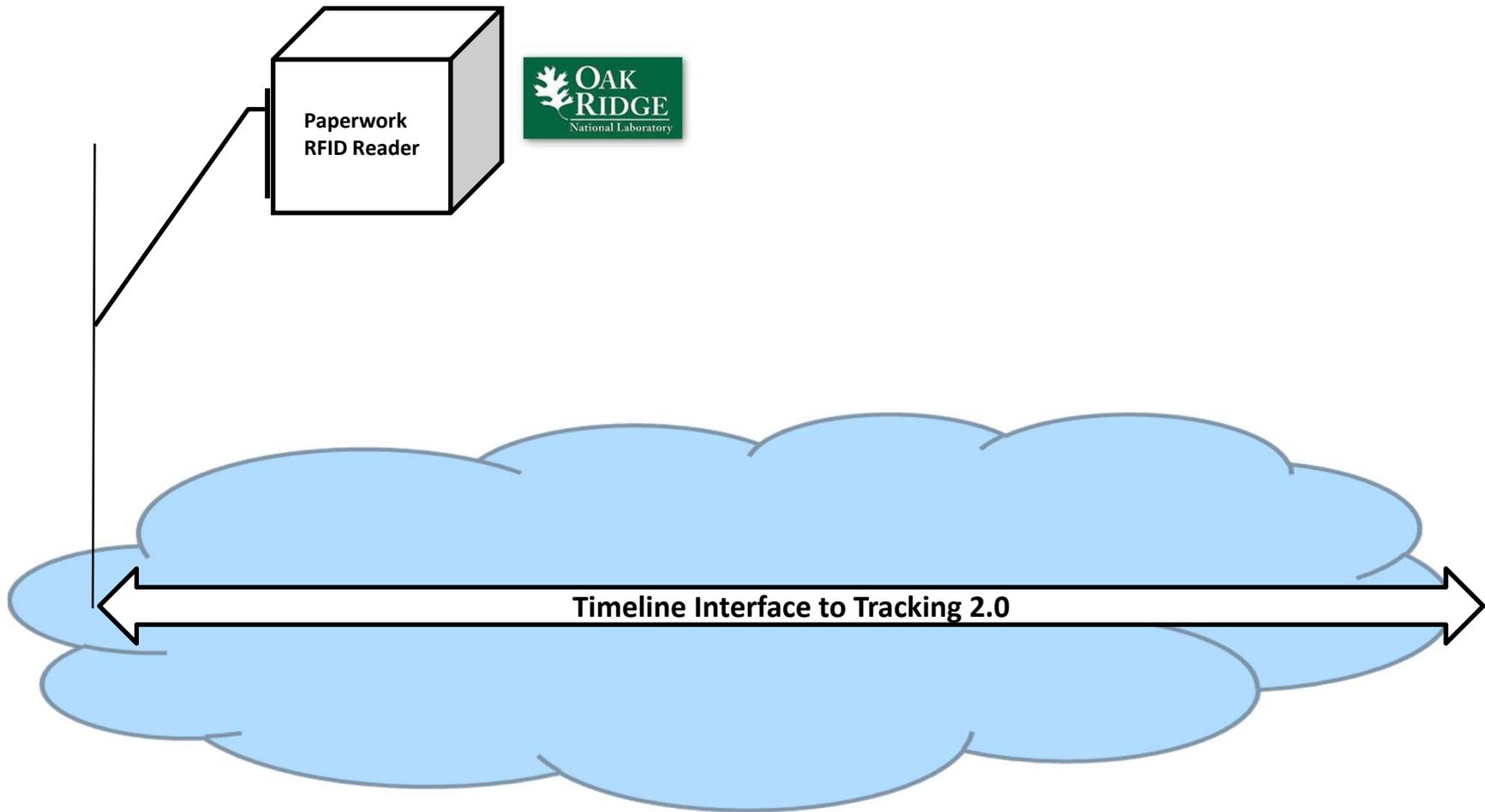
How GRadSTraM Tracking 2.0 Worked



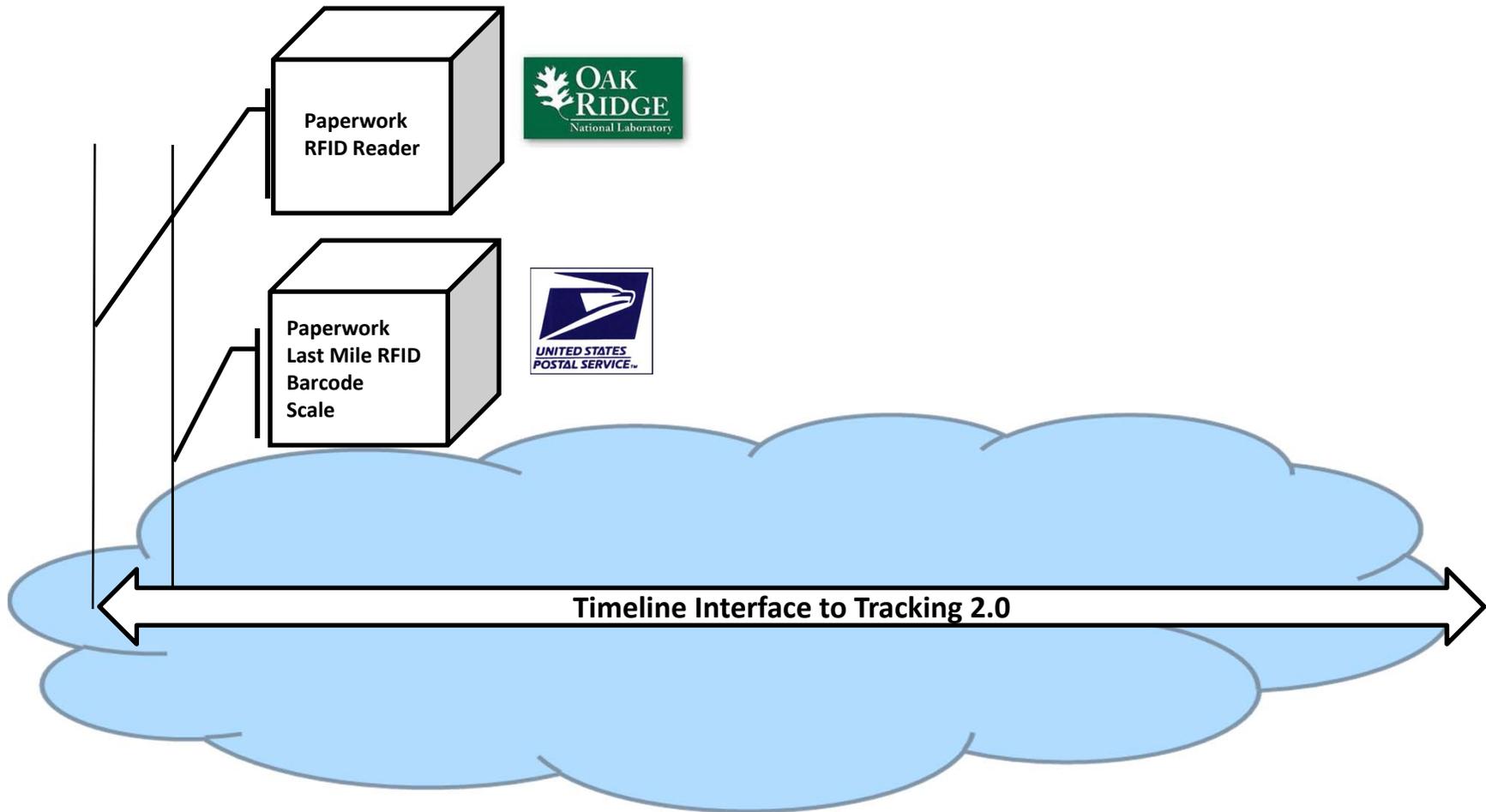
How Tracking 2.0 Works



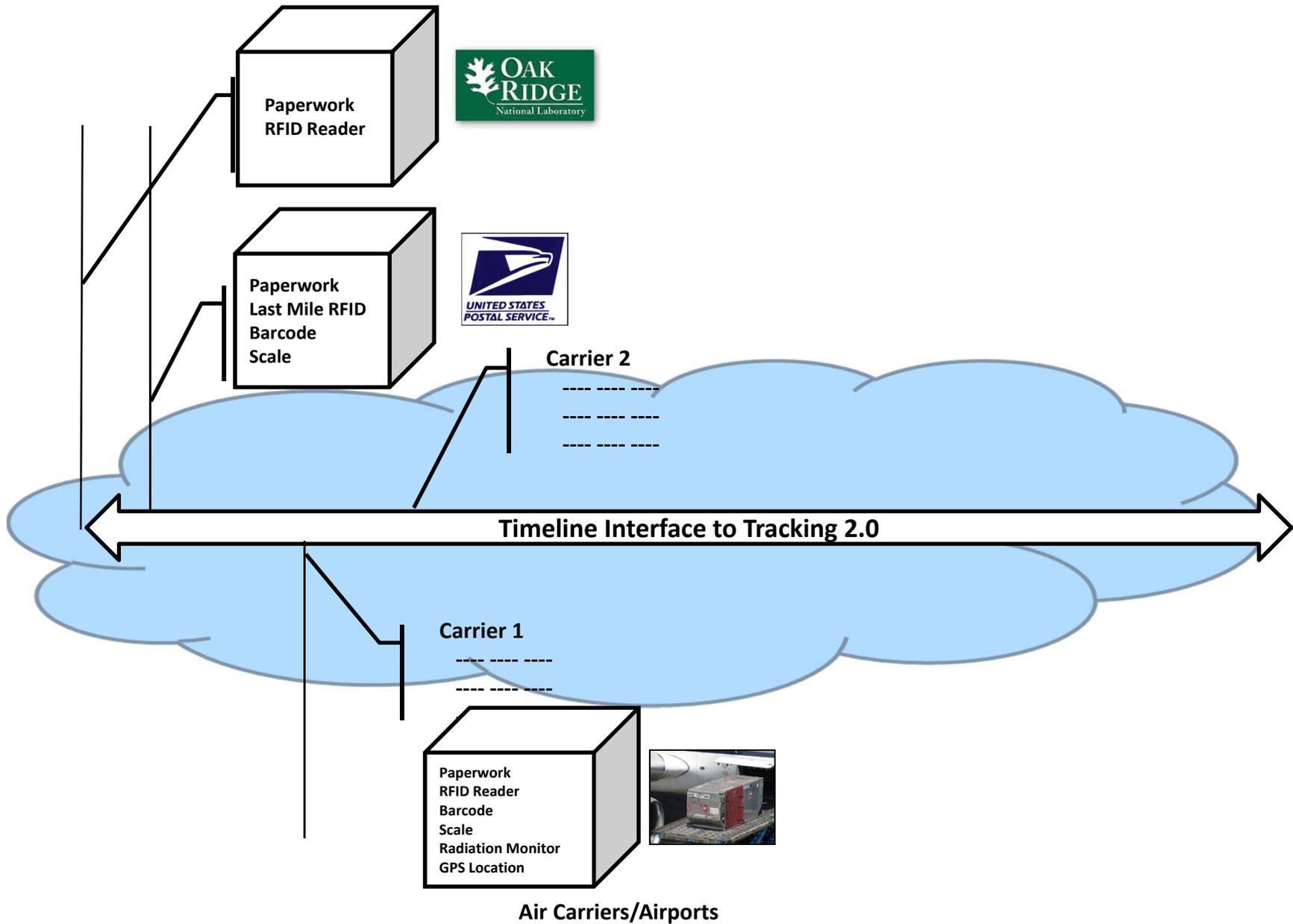
How Tracking 2.0 Works



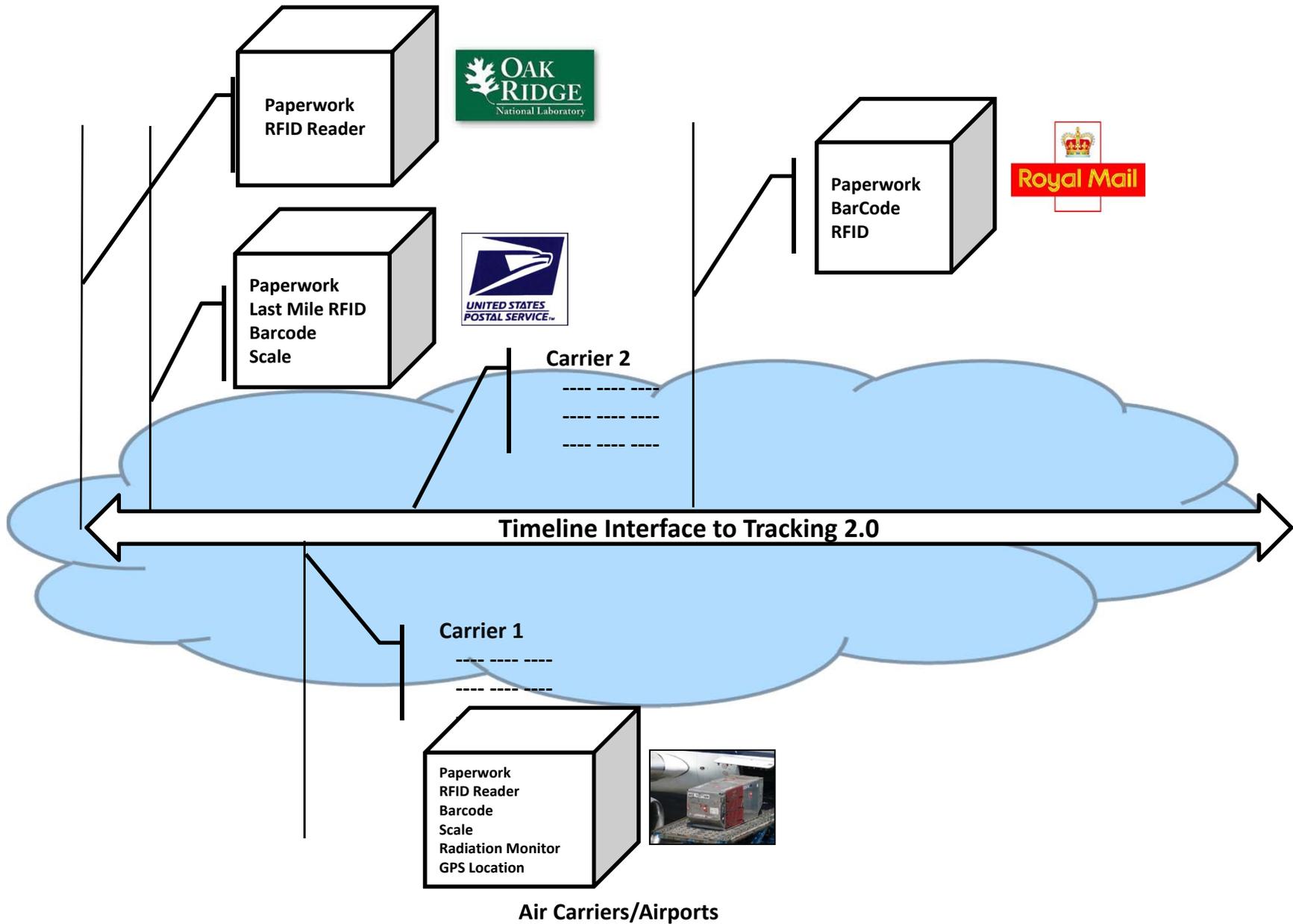
How Tracking 2.0 Works



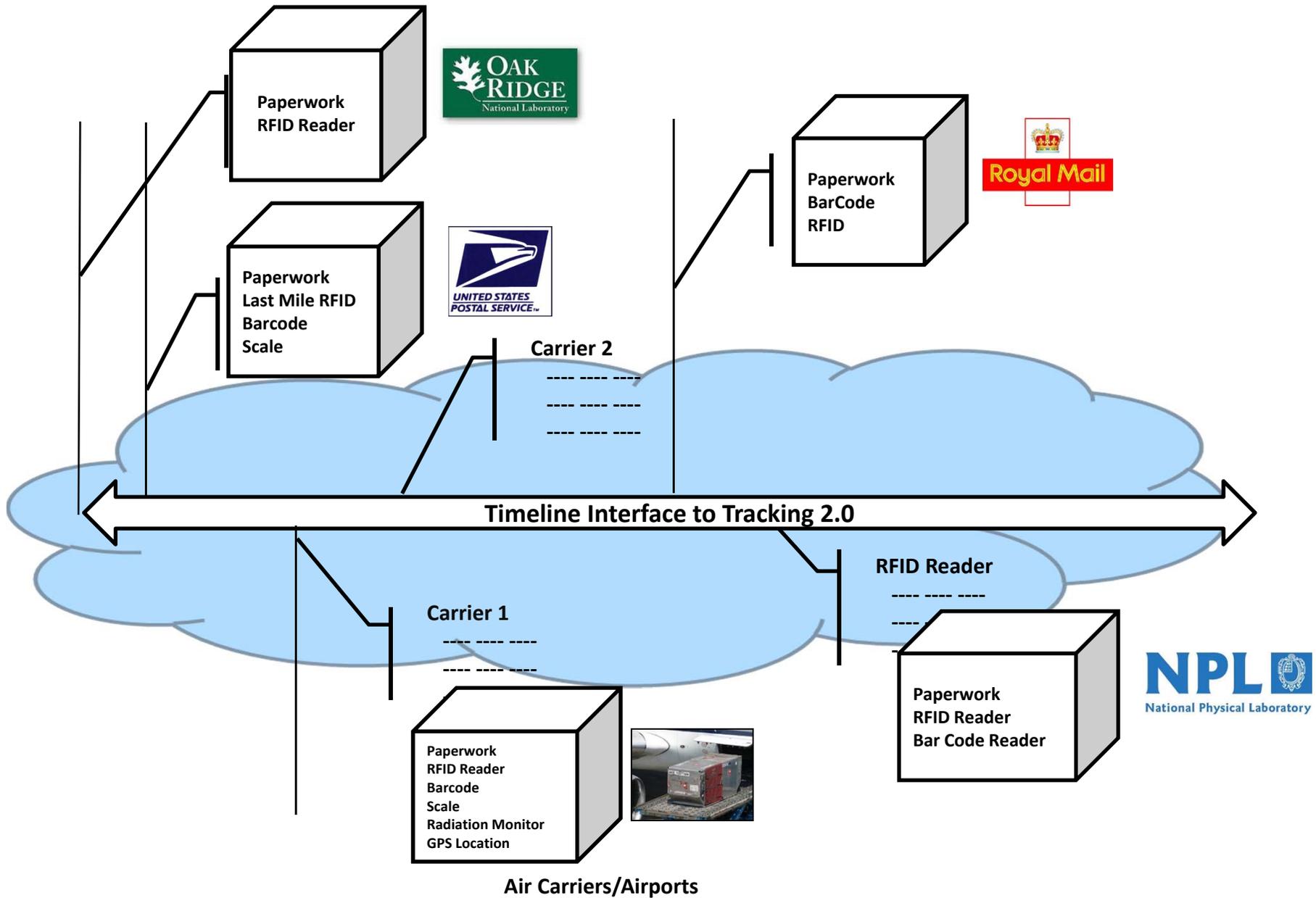
How Tracking 2.0 Works



How Tracking 2.0 Works



How Tracking 2.0 Works



Tracking 2.0 Scorecard

- Validated Web 2.0 enabled RFID tracking systems for radioisotope shipments



- Combining RFID Sensor and Web 2.0 technologies enhances compliance with current regulatory tracking requirements



- Tracking 2.0 is ready for a Phase II Demonstration using a commercial isotope supply chain and next generation sensor technologies



- DOE is willing to offer their National Isotope supply chain as a demonstration platform



Next Demo for Tracking 2.0?

NNSA DOE TSA

DHS

IAEA

EPA

NRC

DOT

- Type A & B Packaging

- Cat 1-4 Source Tracking

- Special Form

Mutually Agreed Protocol for Data Sharing

Embedded Sensor Technology in Next Generation RAM Packages

- National Source Tracking System

- Radioactive Materials in Quantities of Concern

- High Consequence Dangerous Goods

Demonstration: Embed in RAM Supply Chain using integrated COTS/Proprietary Technologies