The Roadmap to Global "All-Hazard" Security Engineering

as part of

the Barbara Rucinska Memorial Global Security Engineering Workshop Series

by

Prof. Andrzej Rucinski, IEEE & University of New Hampshire, USA

UNECE WP.30 Session, Geneva, Switzerland

June 4, 2008

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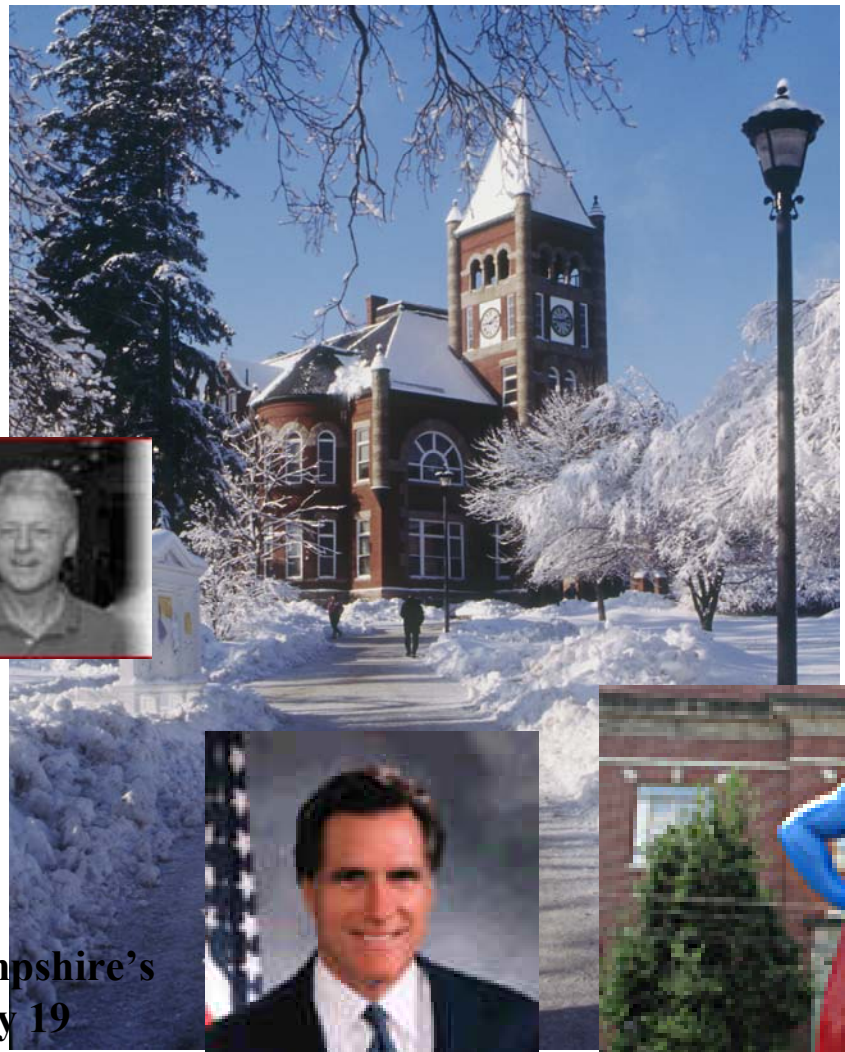


Former Presidents George H.W. Bush and William Jefferson Clinton are Keynote Speakers at the University of New Hampshire's 137th Commencement May 19

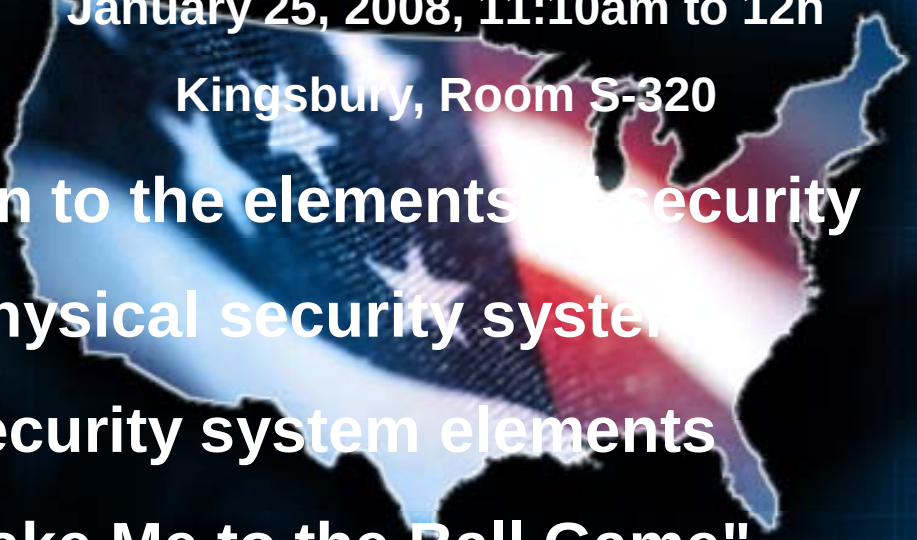
University of New Hampshire

Fundamentals of Security Engineering

ECE668. Introduction to Computer Engineering

January 25, 2008, 11:10am to 12n

Kingsbury, Room S-320



- **Introduction to the elements of security**
- **A typical physical security system**
- **Physical security system elements**
- **Project: "Take Me to the Ball Game"**

Mr. Lennart E. Long and Mr. George Neat

Guest Speakers, Electrical and Computer Engineering Department

University of New Hampshire

IEEE Institute of Electrical & Electronics Engineering

- **350,000+ IEEE Members Worldwide**
- **IEEE Provides**
  - **Global Reputation for Standards (e.g. 802.11, 1149)**
  - **Professional, Ethical Conduct, and Intellectual Honesty**
  - **The World's Largest Technical Publishing Enterprise**
  - **Highest Quality Conferences and Publications**

Outline

- **Motivation: New Science and Education for Global Security**
- **All-Hazard Safety and Security Strategy**
- **Global Security Engineering**
- **Safe and Secure Silk Road**
- **Transatlantic Security Initiative**

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Motivation: New Science and Education for Global Security

- **UN General Assembly Resolutions**
- **UNECE Initiatives**
- **Computerized TIR Procedure (eTIR)**
- **Global Security: Role of Science**
- **Vision: All-Hazard Safety and Security Strategy**

Outline

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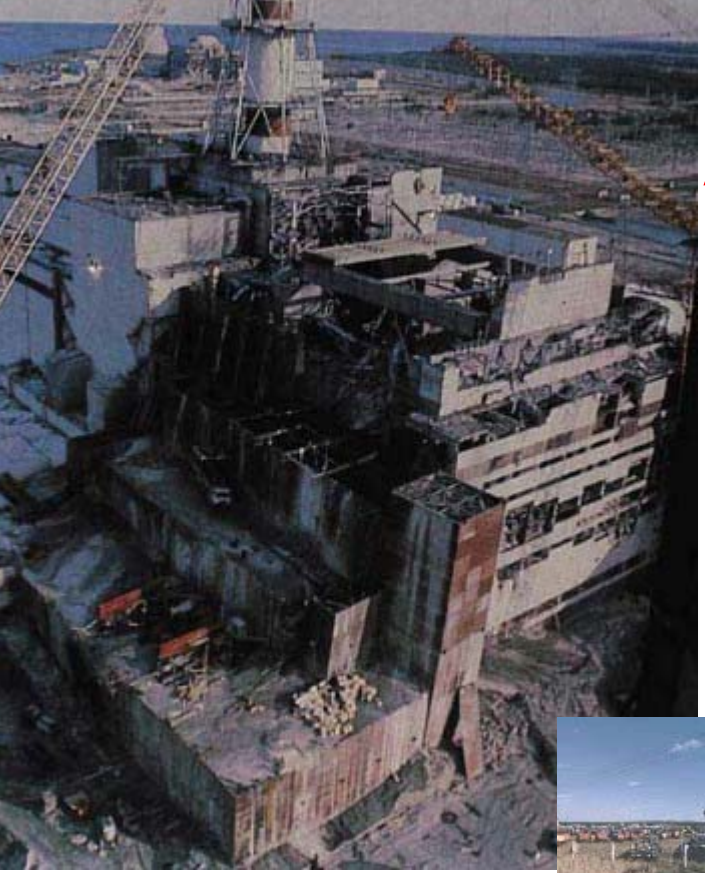
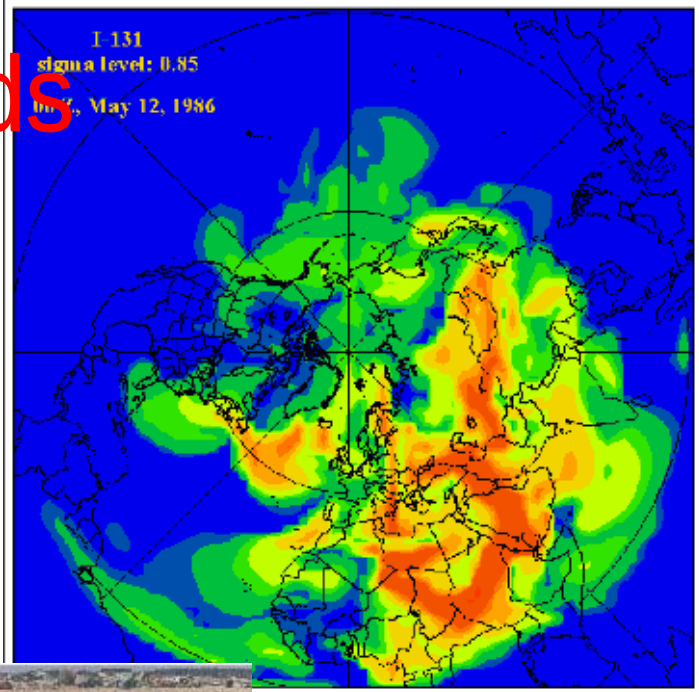
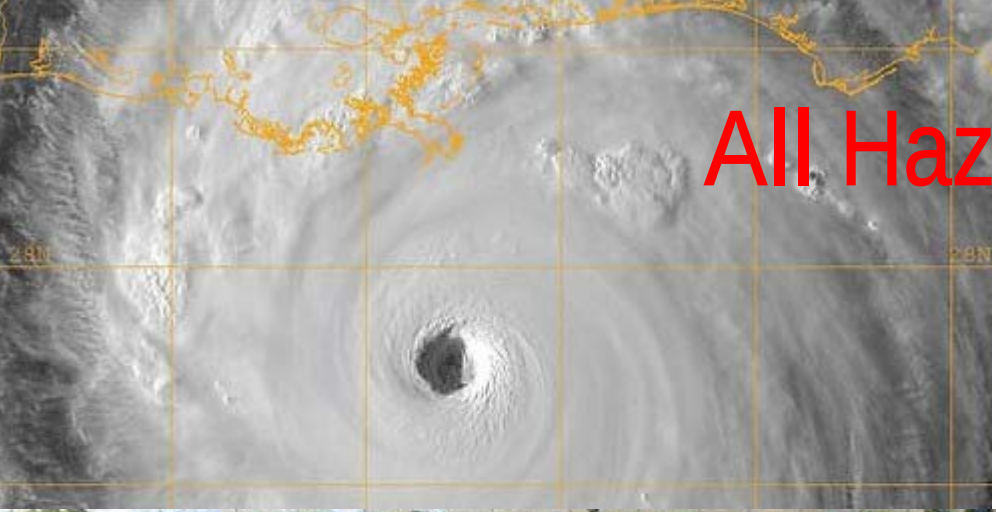
All Hazards

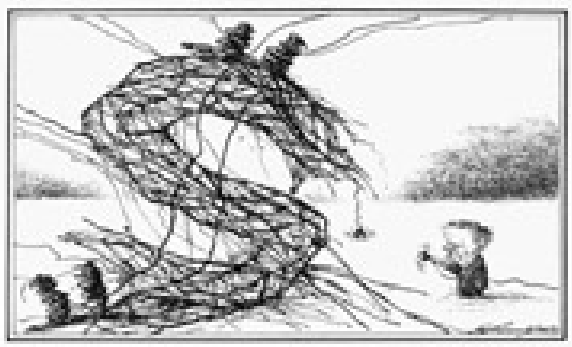




All Hazards

All Hazards





All Hazards

The Ice Storm of 1998 was a natural disaster like no other. It affected millions of Canadians and left everyone wondering just how vulnerable modern society was to the elemental forces of nature.

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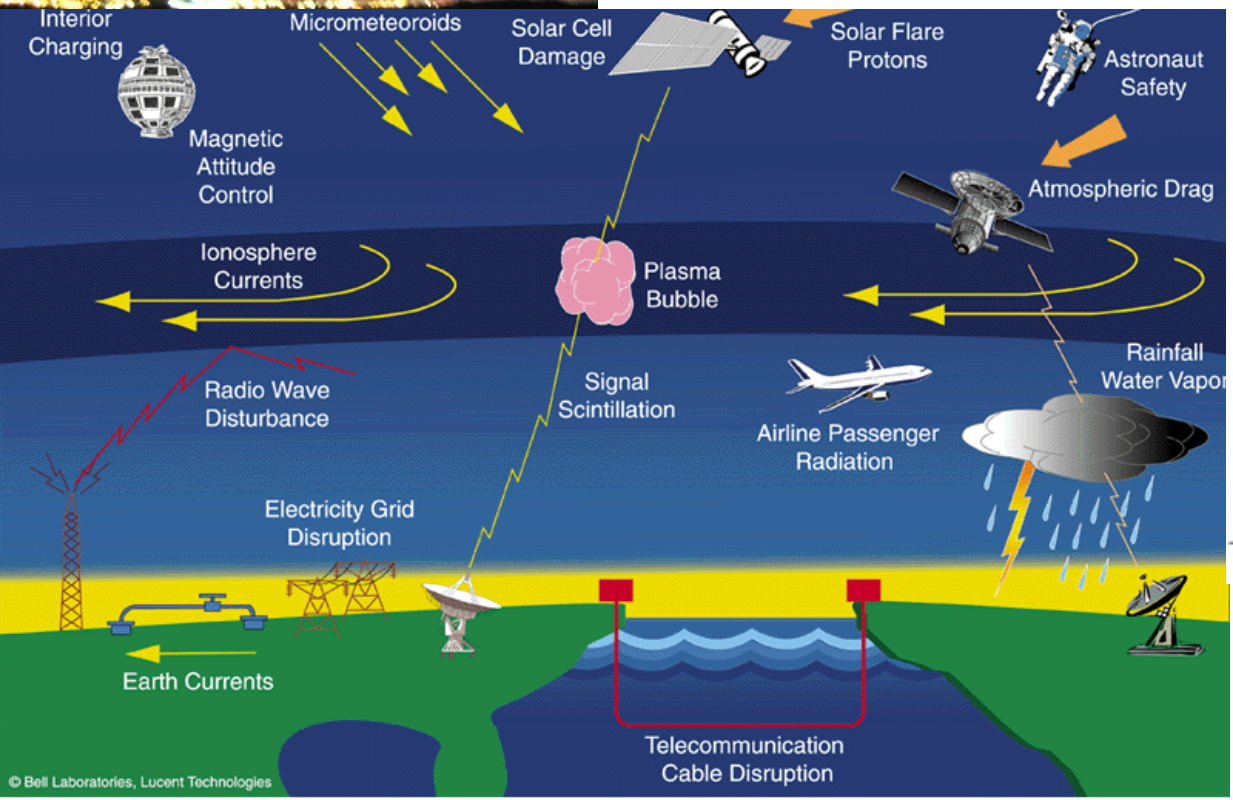
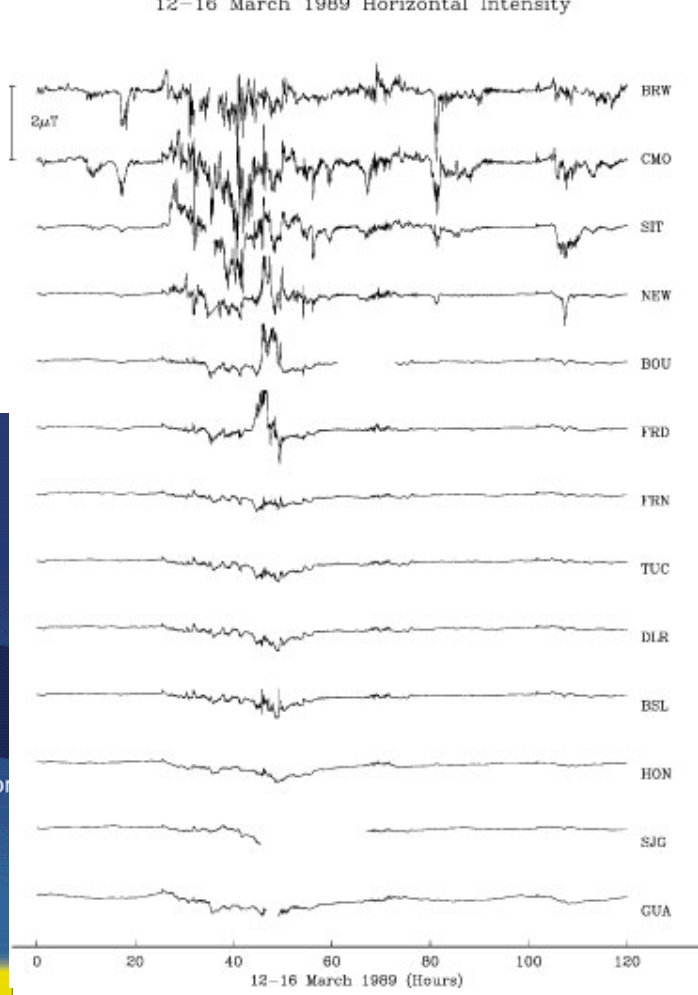
All Hazards





The effects of magnetic storms - what scientists call space weather - extend from the ground to geostationary orbit and beyond.

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All Hazards


The Boston Globe

TUESDAY, APRIL 29, 2008

Gas service woes to go on

Months of disruptions likely for downtown neighborhoods

Girl
dran

J.A. Stats Restaurant & Bar on Broad Street in the Financial District was among hundreds of businesses shut down yesterday by the gas service interruption resulting from a Saturday morning water-main break.

By John C. Drake

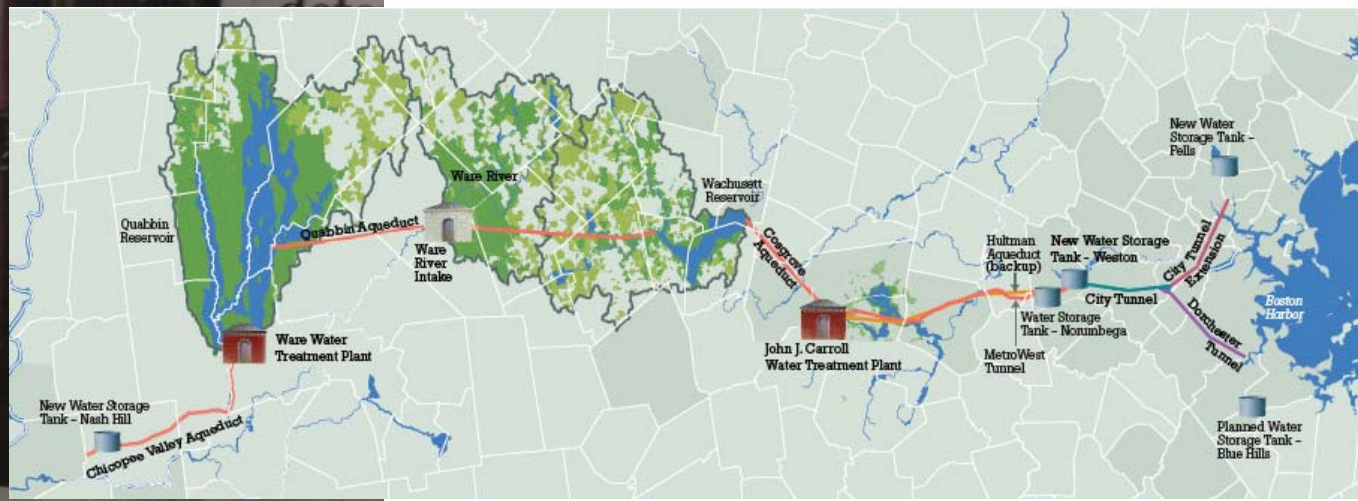
Residents and businesses in the Financial District and parts of the North End could suffer sporadic failures of gas service through the spring and possibly into summer and beyond, because it will take months for utility crews to remove all water trapped in gas lines by a weekend water-main break, officials said.

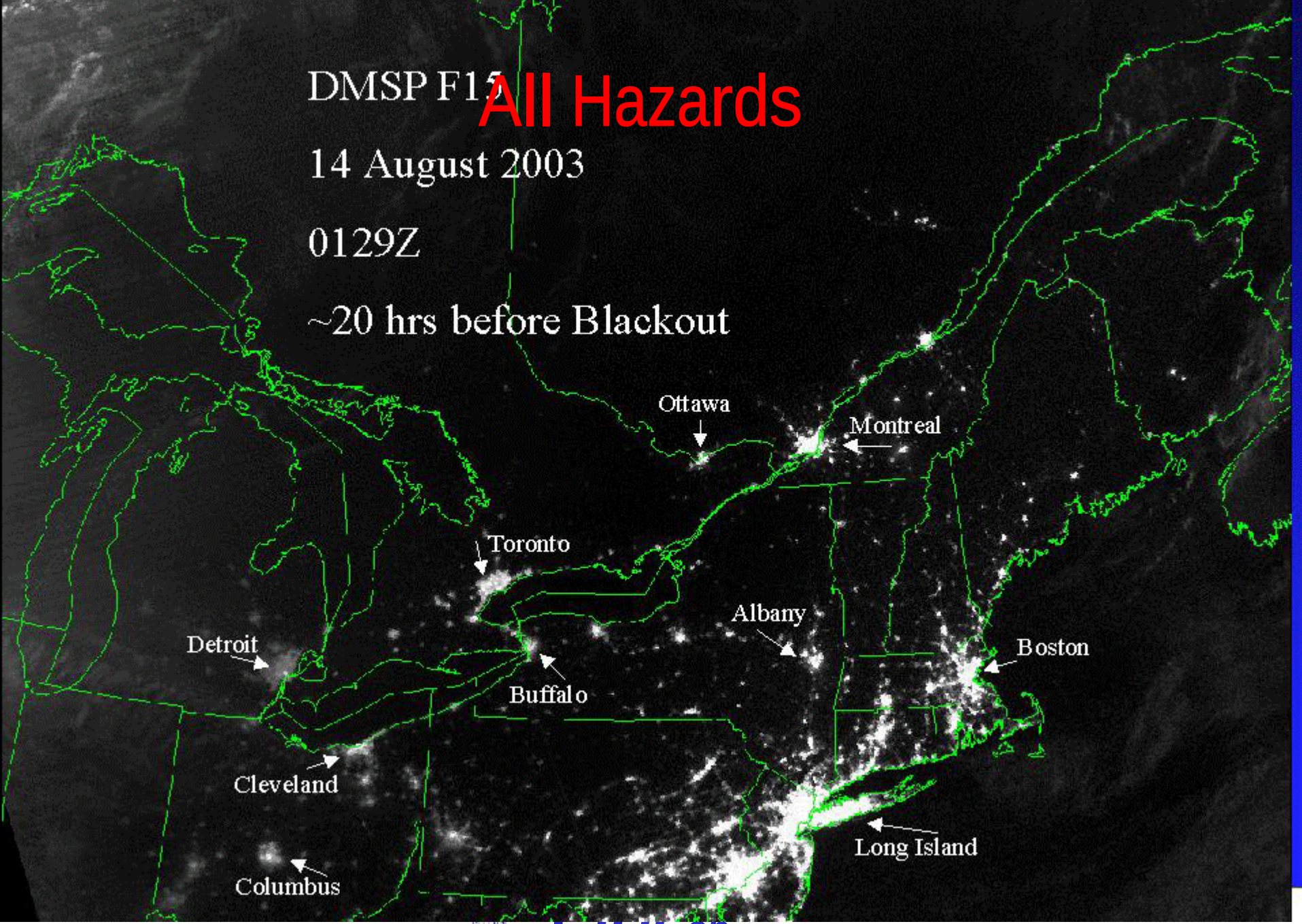
In an ominous sign for hundreds of residents and business owners seeking reimbursement for damaged appliances, lost customers, hotel bills, and other losses, National Grid and the Boston Water and Sewer Commission disagreed over who will be responsible for the claims. A commission spokesman said the matter may end up in court.

City and utility officials also were unable to provide an estimate of the damages, which appeared to climb into the millions of dollars yesterday, as crews and business owners

GAS SERVICE, Page A7

Aaron Ferreira cleaned a gas pipe by hand in the Financial District yesterday as Feeney Brothers Construction co-workers Bill Mayer (left) and Marty Kilgallen stood ready to assist.




DMSP F15
All Hazards
14 August 2003
0129Z
~20 hrs before Blackout
Ottawa
Montreal
Toronto
Albany
Detroit
Boston
Buffalo
Cleveland
Long Island
Columbus


All Hazards

Global Security
Protection of Critical Infrastructure Against All Hazards

- **Nature**
  - **Direct**
  - **Trigger**
- **Accident**
  - **Design & Implementation**
  - **Operations**
- **Malicious Actions**
  - **Sabotage (Internal)**
  - **Terrorism (External)**

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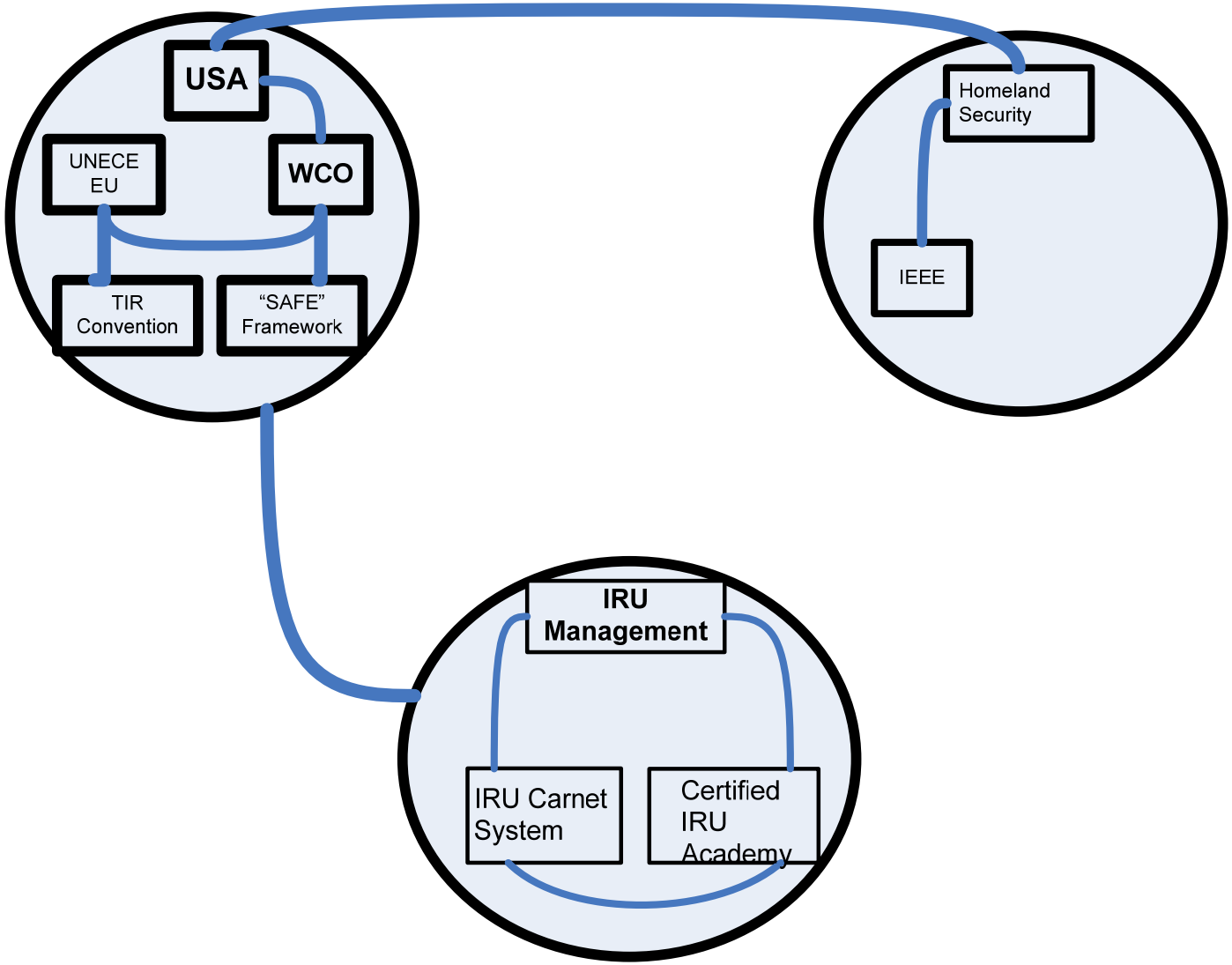
Global Security Transportation: Current Status



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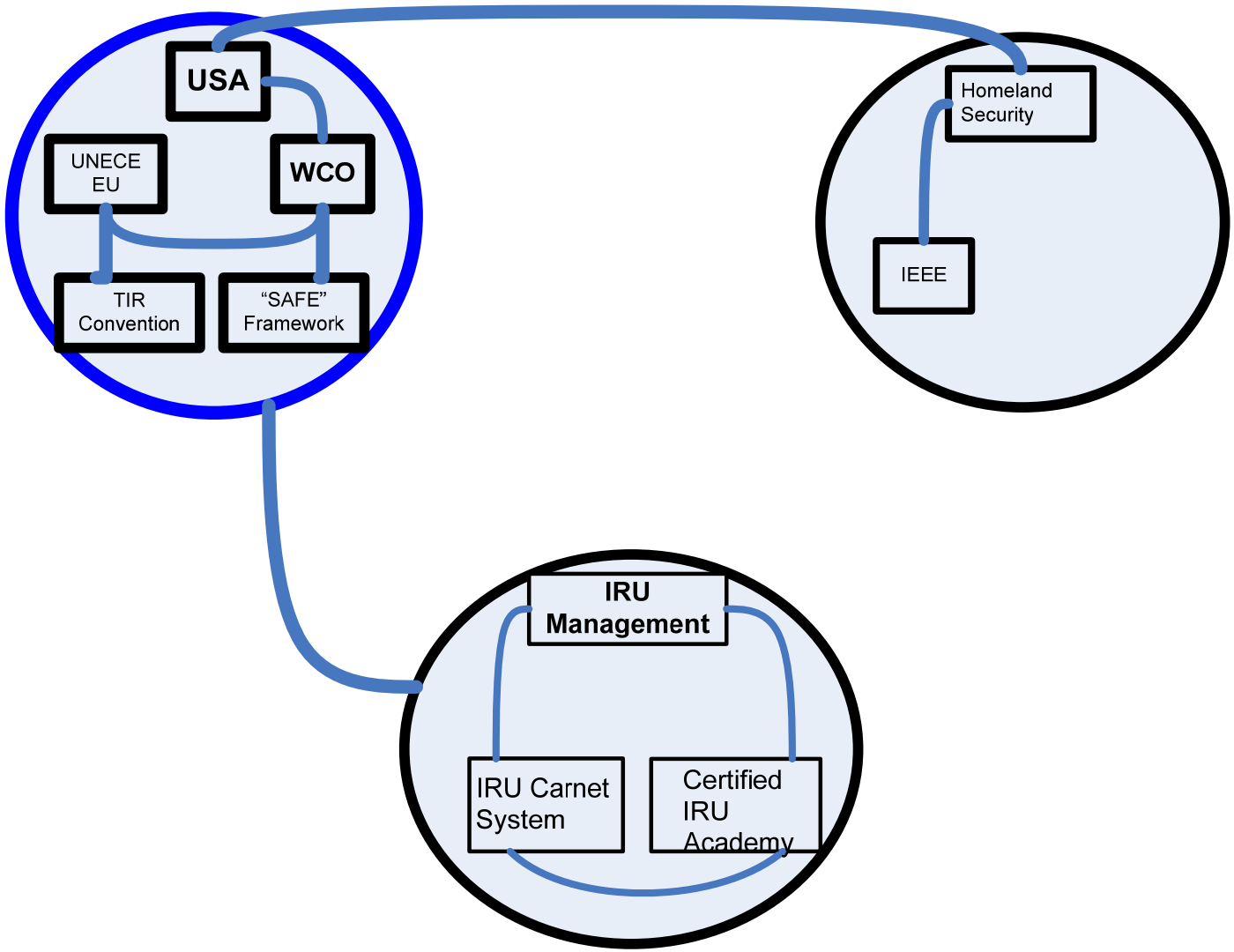
Global Security Transportation: Political Sphere



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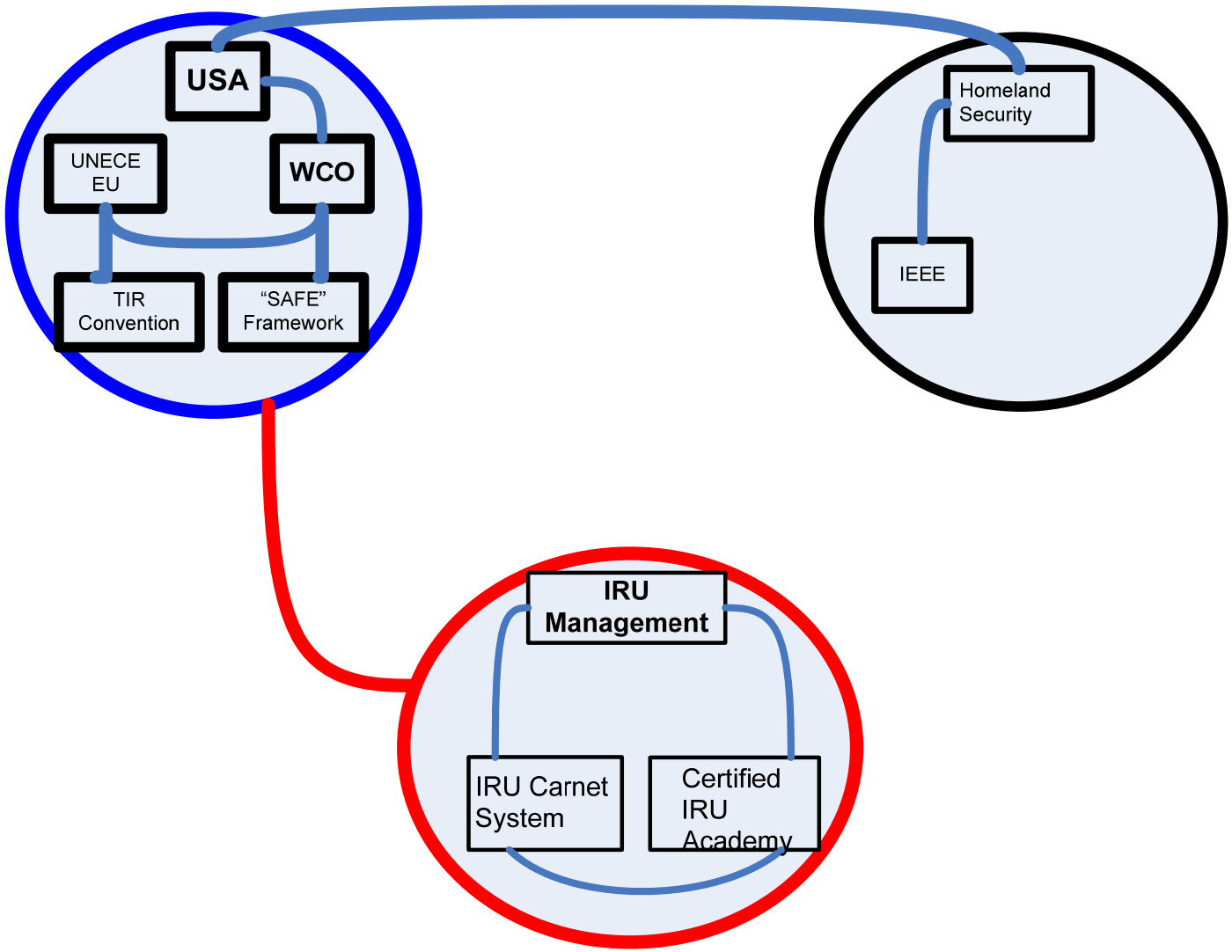
Global Security Transportation: Commerce



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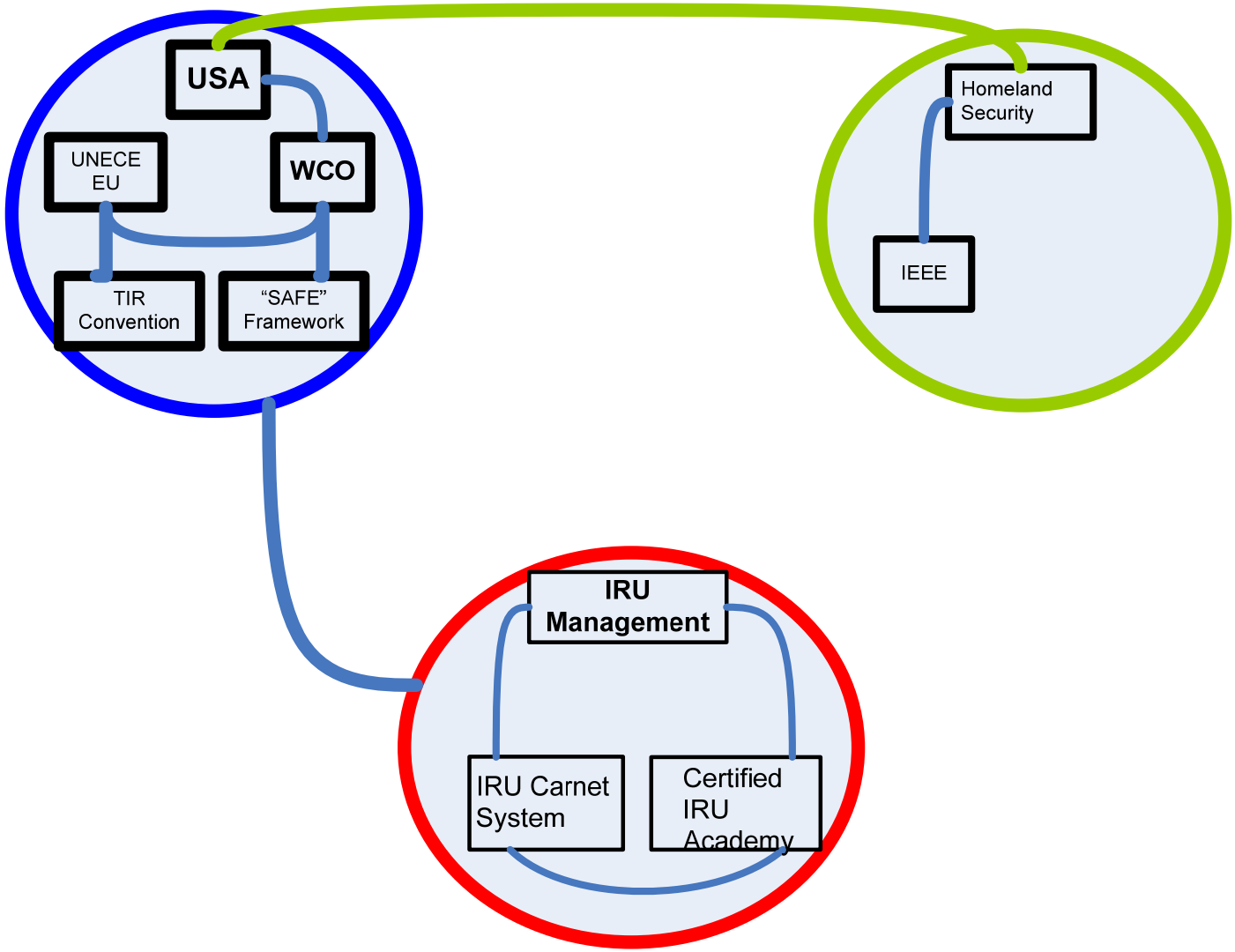
Global Security Transportation: Science



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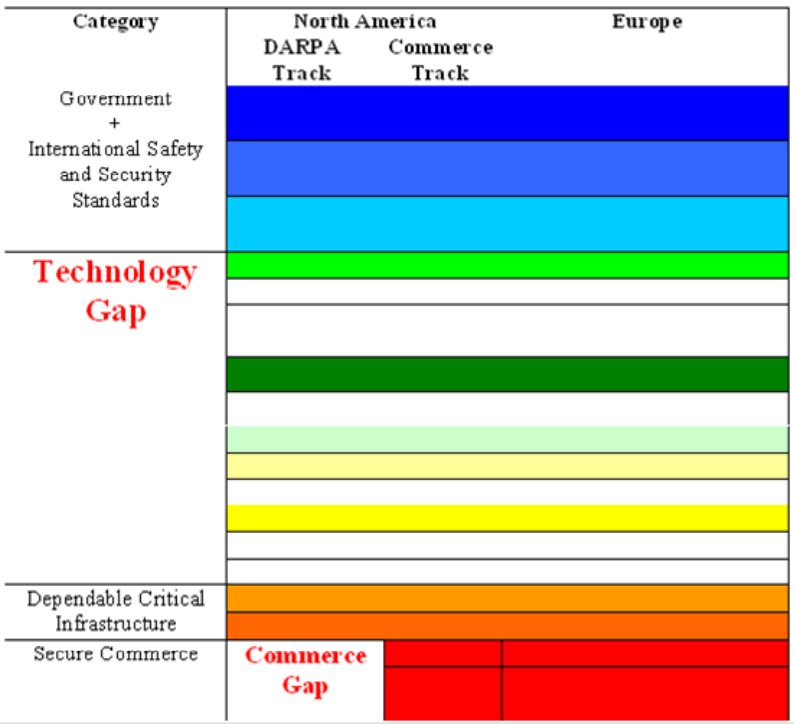
Rainbow Framework for Global Security Engineering



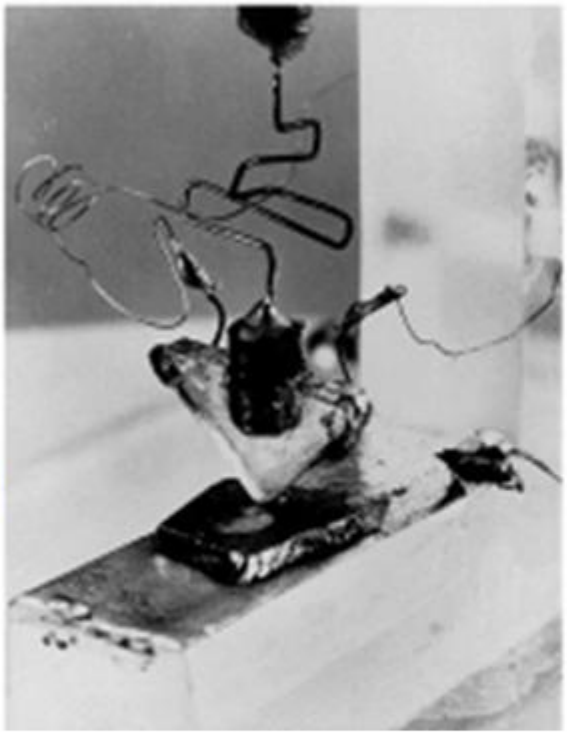
- United Nations Economic Commission for Europe
- US Government
- **Science and Technology Gap**
- Global Secure Transport System e.g. IRU

Global Security Engineering as a New Scientific Discipline

- Vision Informally Discussed at Different Forums and Presented at **2008 International IEEE Conference on Homeland Security Technologies in Waltham, Massachusetts** in May 2008
  - Global Ambient Intelligence Network (GAIN)
  - **Design for Globalization (DfG)**
  - GNAT-1 (presented at Waltham, Massachusetts by UNH Students)

The Transistor Era

a



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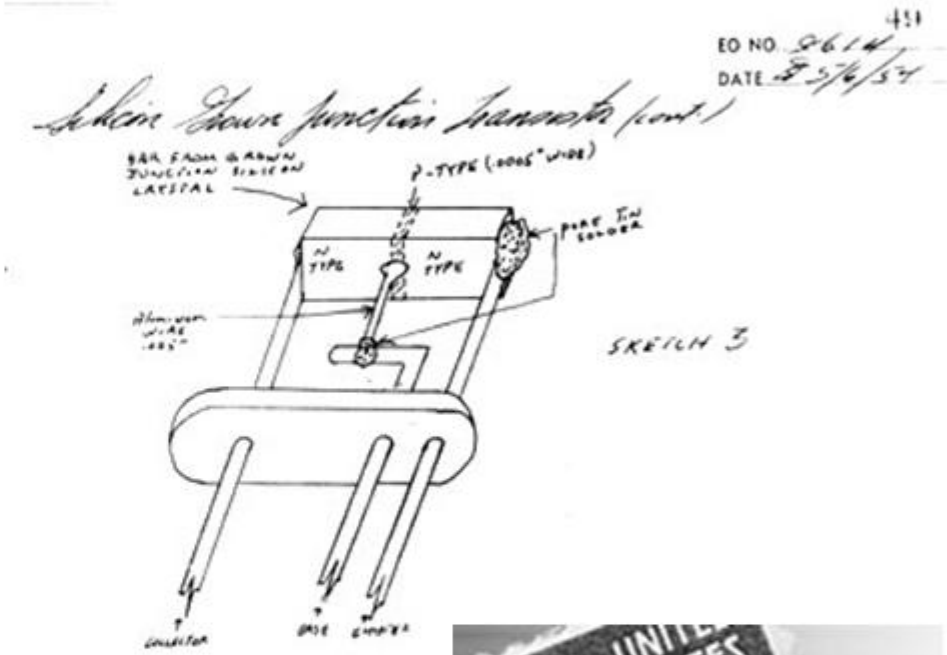
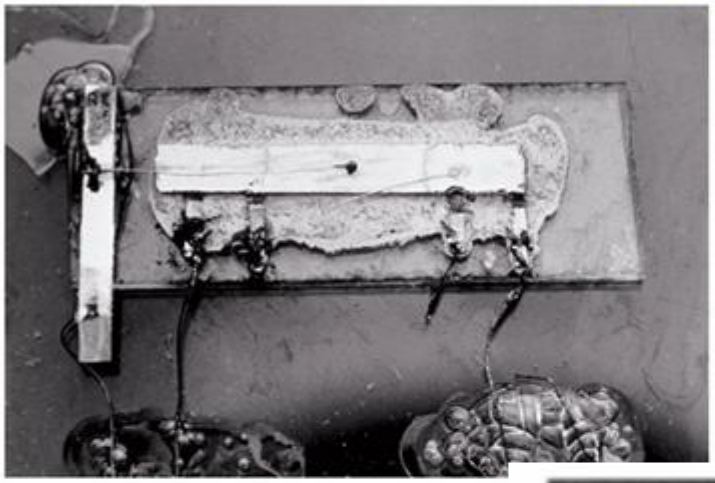


b

d

SSI Era

a



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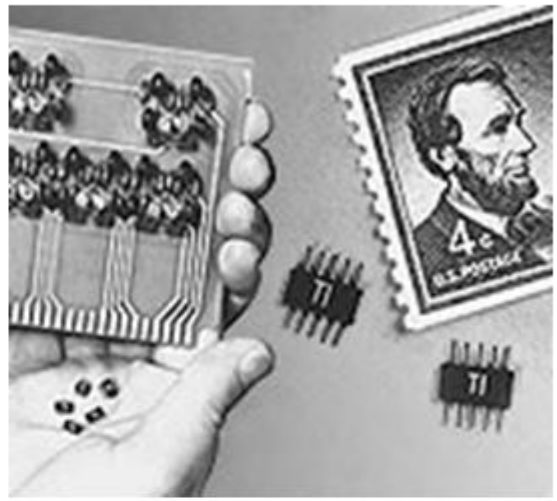

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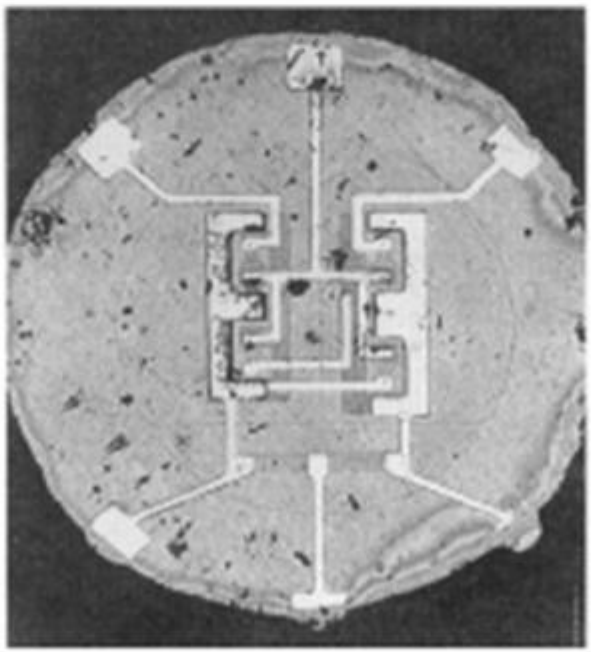
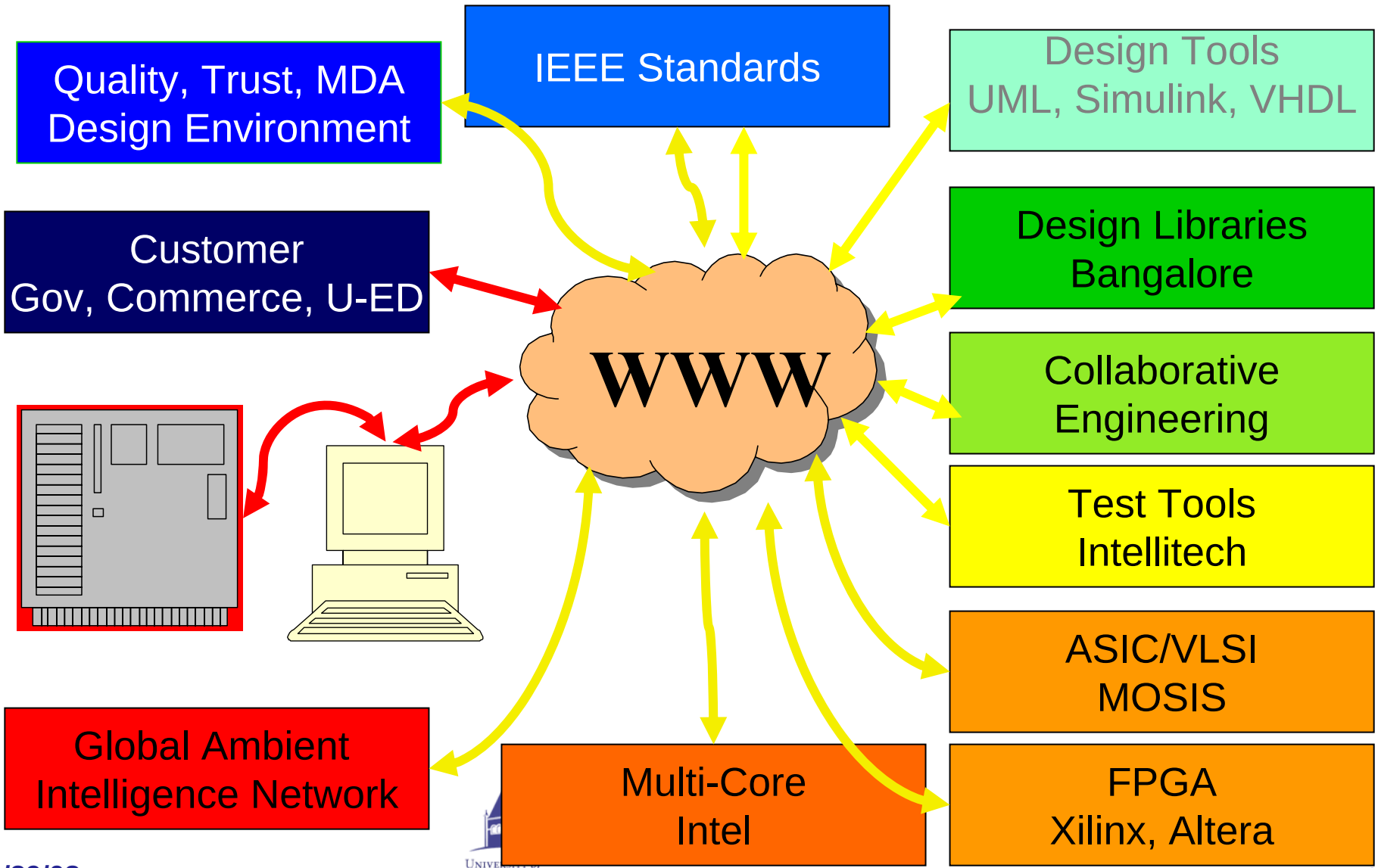
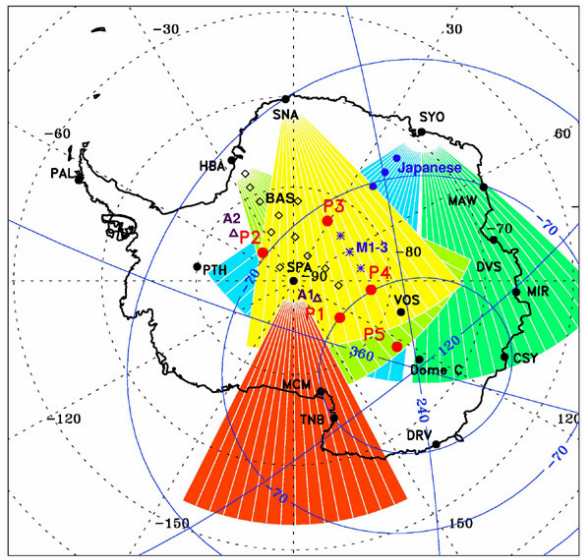


Design for Globalization (DfG)



Magnetometer System for Space Research in Polar Region

-

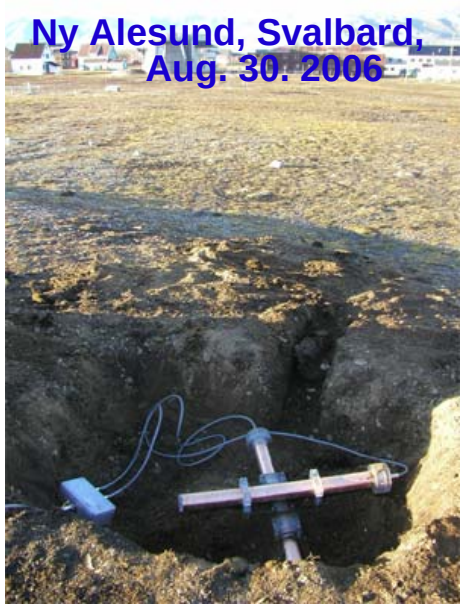


Courtesy of Hyomin Kim

Magnetometer System for Space Research in Polar Region

Ny Alesund (NAL), Norway

Longyearbyen (LYR), Norway



Barentsburg (BAB), Russia

Horsund (HOR), Poland

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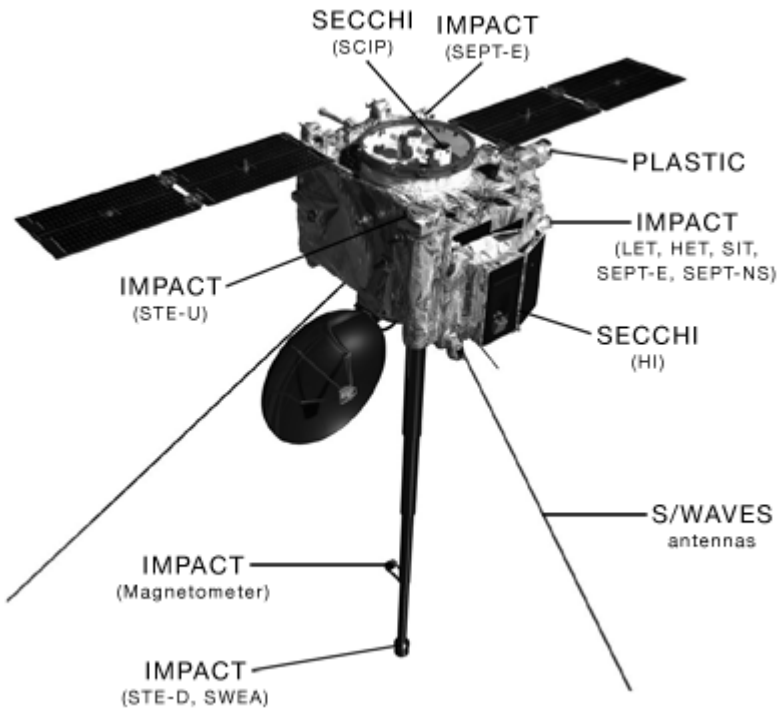
* Data Base with automatic update/scheduler

Courtesy of Hyomin Kim

Example of Current Magnetometer System for Space Research in Space

- *Satellite- and rocket-borne*
- *magnetometers*



Courtesy of Hyomin Kim

Courtesy of Hyomin Kim

The Barbara Rucinska Memorial Global Security Engineering Workshop Series

- **Stockholm EWME2006 (*Global Engineering Education*)**
- **San Diego MSE2007 (*Special Issue of IEEE Trans. on Education*)**
- **Boston HST2008 (*Proc. IEEE: Special Issue on Global Security Engineering*)**
- **Gdansk IT2008 (*EURO2012*)**
- **Budapest EWME2008 (*Bologna + ABET*)**
- **Geneva 2008 United Nations (*Global Security Working Session*)**
- Copenhagen WSS2008 (*Microelectronics for Maritime Security*)
- San Francisco MSE2009 (*Special Issue of IEEE Trans. on Education*)
- Almaty 2009 TIR Congress (*Safe and Secure Silk Road*)

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- **San Diego MSE2007 (*Special Issue of IEEE Trans. on Education*)**
- **Boston HST2008 (*Proc. IEEE: Special Issue on Global Security Engineering*)**
- **Gdansk IT2008 (*EURO2012*)**
- **Budapest EWME2008 (*Bologna* + *ABET*)**
- **Geneva 2008 United Nations (*Global Security Working Session*)**
- Copenhagen WSS2008 (*Microelectronics for Maritime Security*)
- San Francisco MSE2009 (*Special Issue of IEEE Trans. on Education*)
- Almaty 2009 TIR Congress (*Safe and Secure Silk Road*)

Global Security Engineering Think Tank

- **IEEE**
- **WP.30 Ad Hoc Technology Expert Group**
- **US Chamber of Commerce**
- European Commission
- IMO
- Transport Research Board
- **Global Infrastructure Alliance - International Think Tank**

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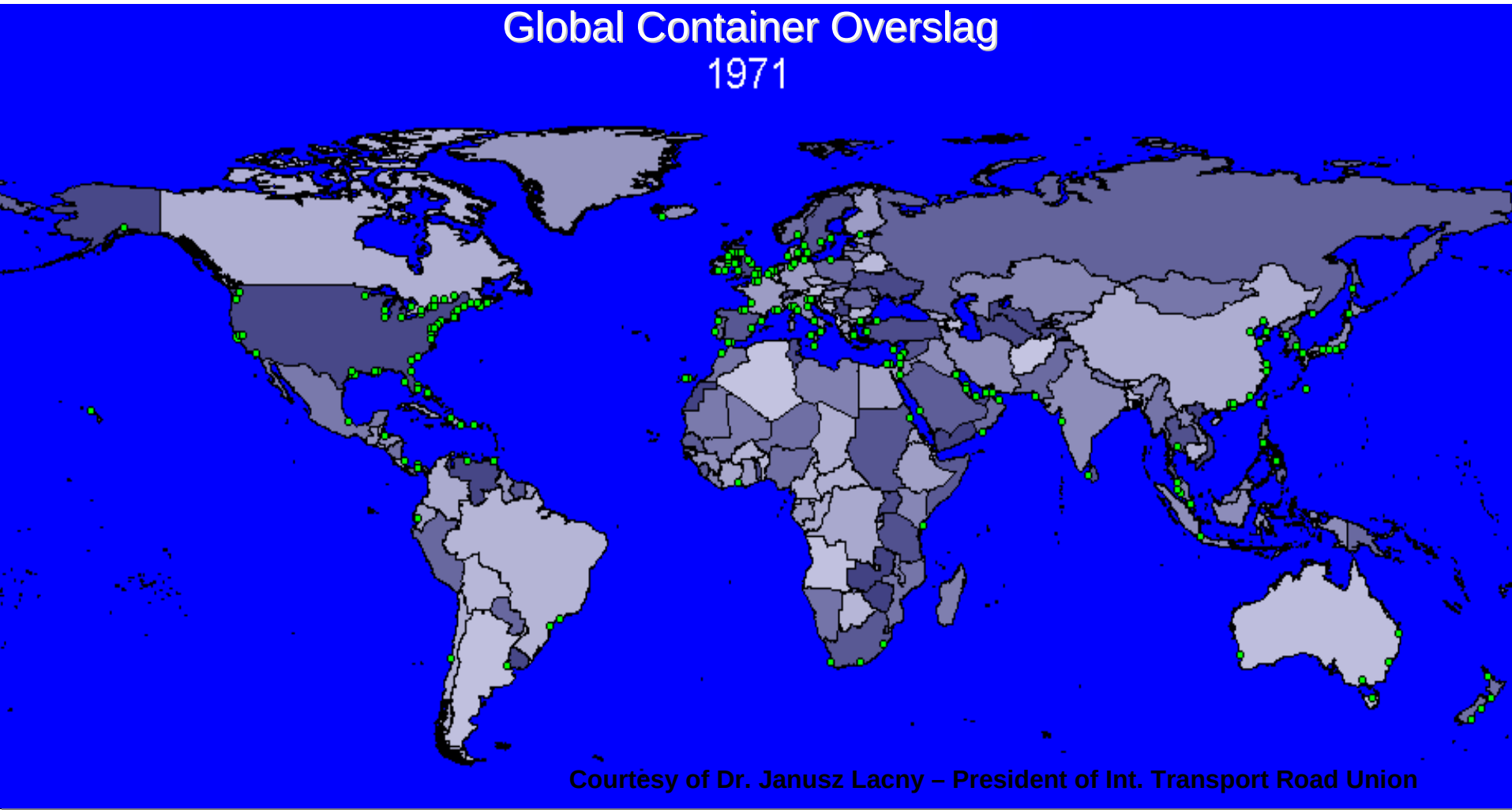
Global Security Engineering Pilots

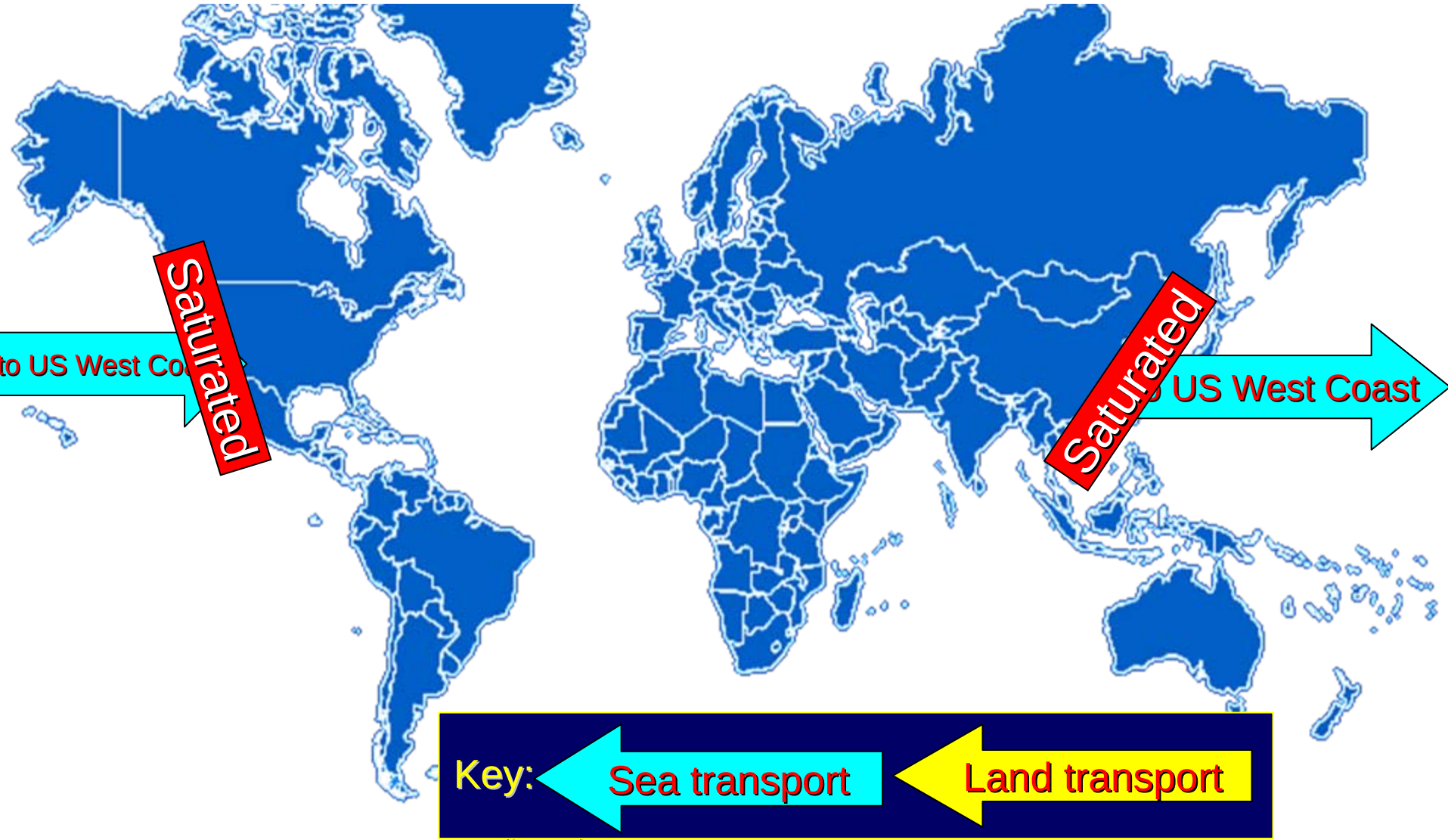
- Earth Magnetic Field Monitoring
- Safe and Secure EURO2012
- Safe and Secure Silk Road
- Canada – US Secure Cargo Project

Evolution of sea containers in ports

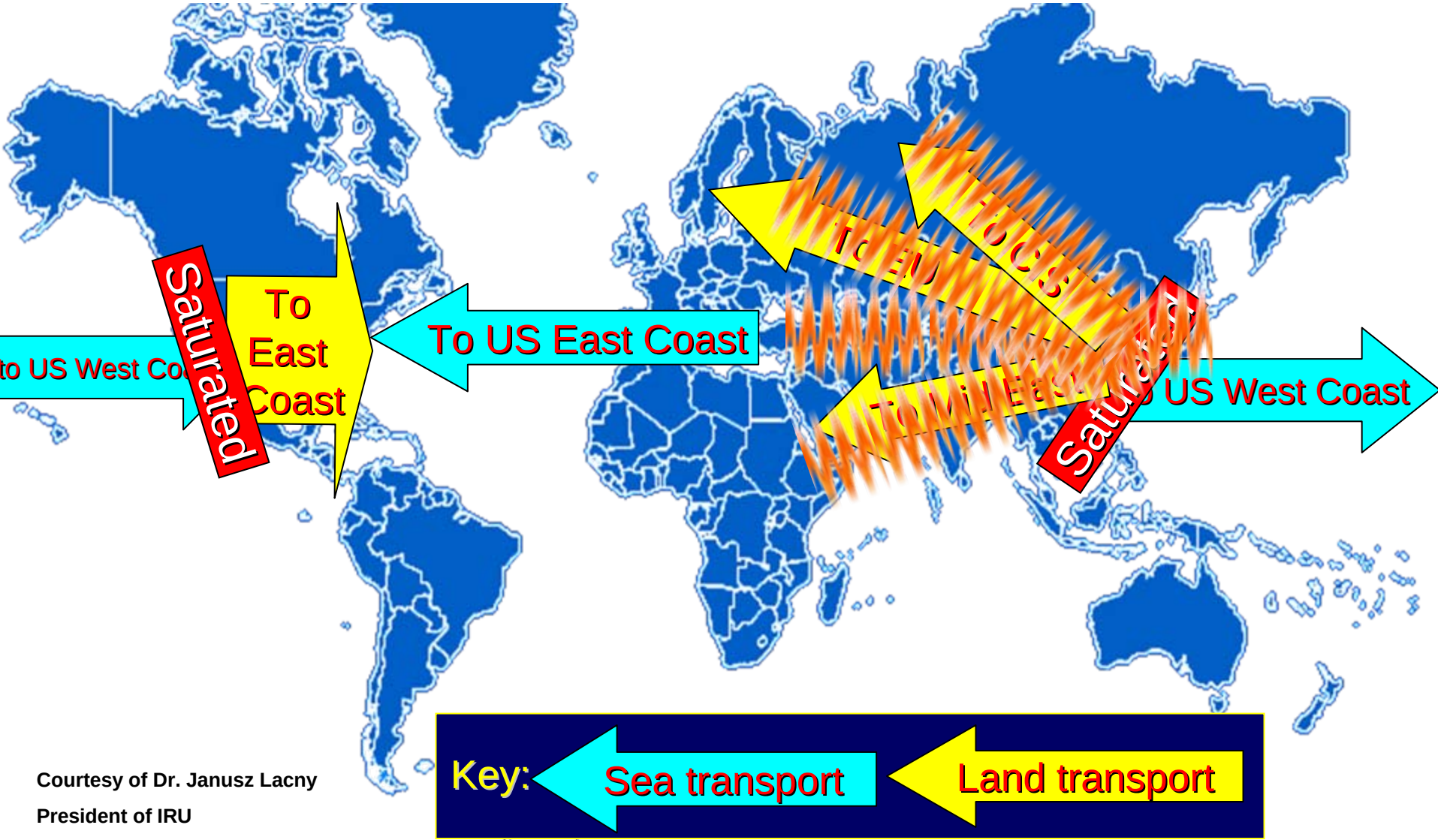


Safe and Secure Silk Road

Courtesy of Dr. Janusz Lacny – President of Int. Transport Road Union



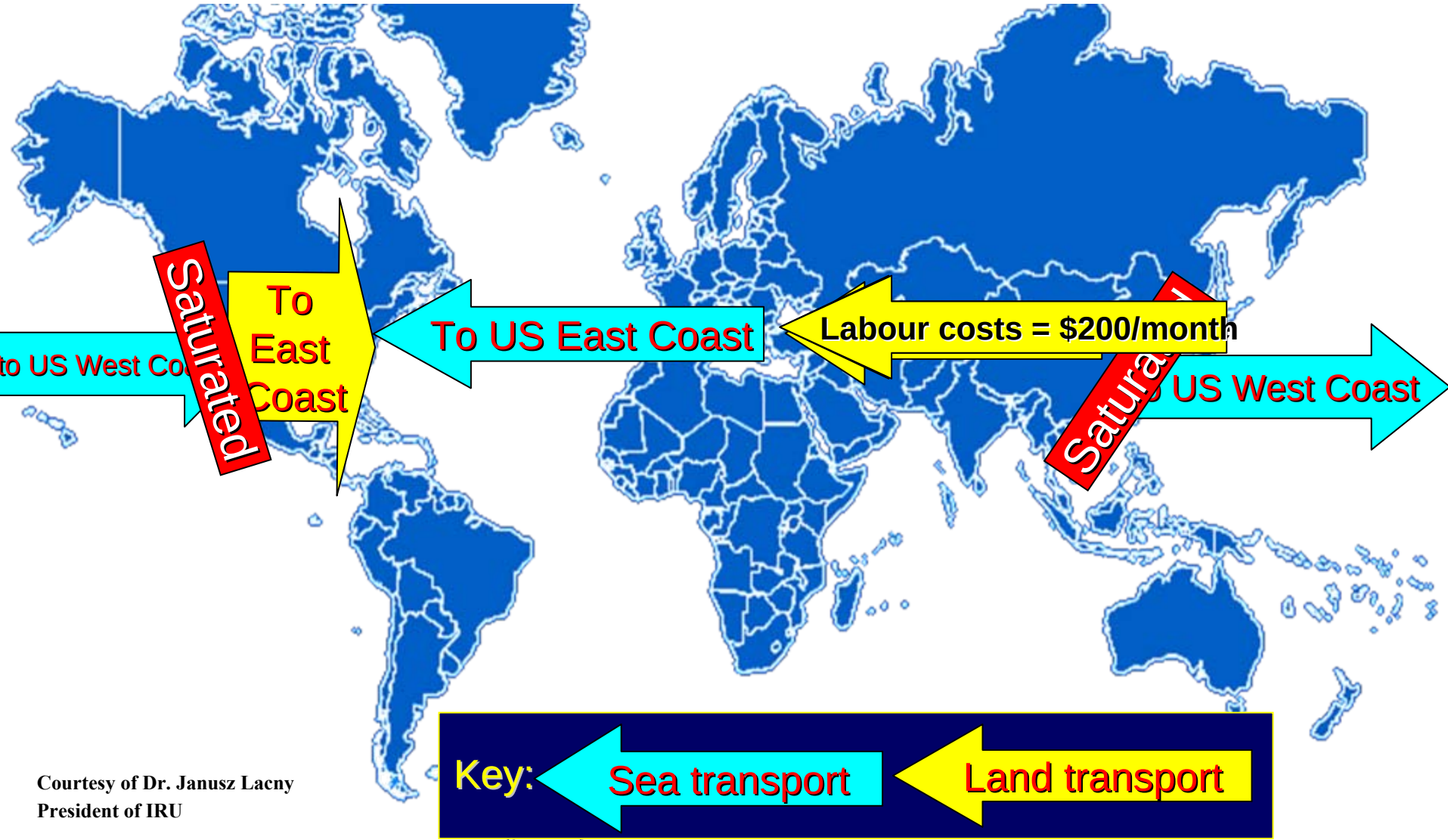
Interconnecting all the businesses along the reopened Silk Road



Courtesy of Dr. Janusz Lacny

President of IRU

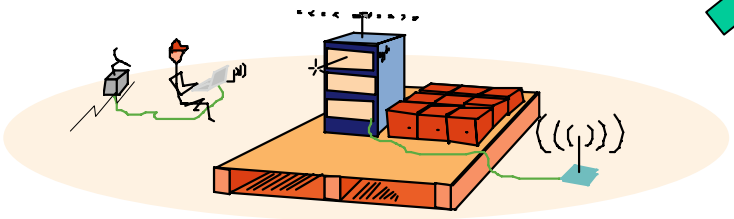
Interconnecting all the businesses along the reopened Silk Road



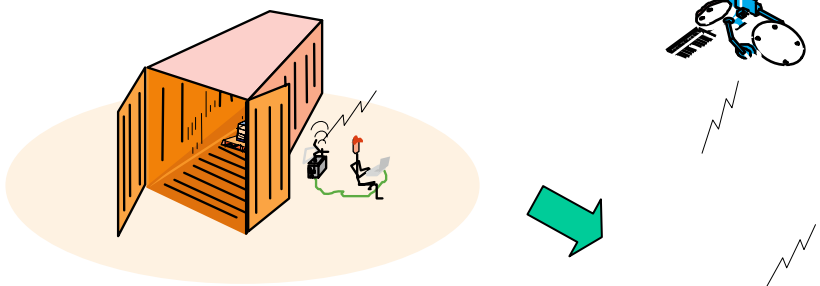
Courtesy of Dr. Janusz Lacny
President of IRU

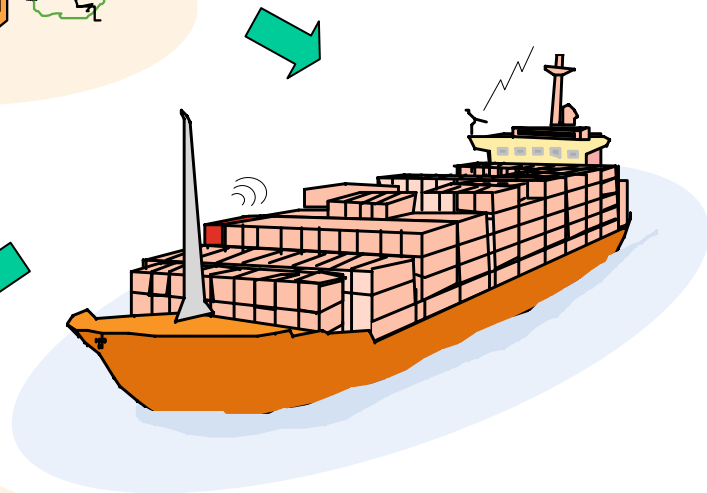
Canada US Transatlantic Cargo Security Pilot

1) Build & test prototype package



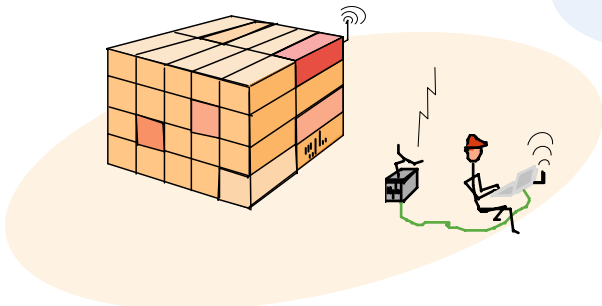
2) Install & verify package and scan at load point



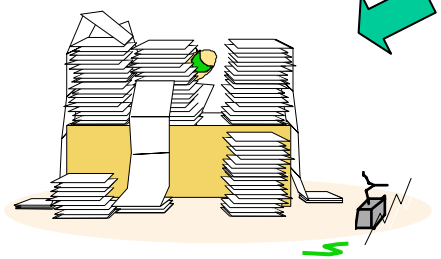


3) Track shipment, log data & report status to website

4) Scan at transshipment points



5) Compare logged and real-time data



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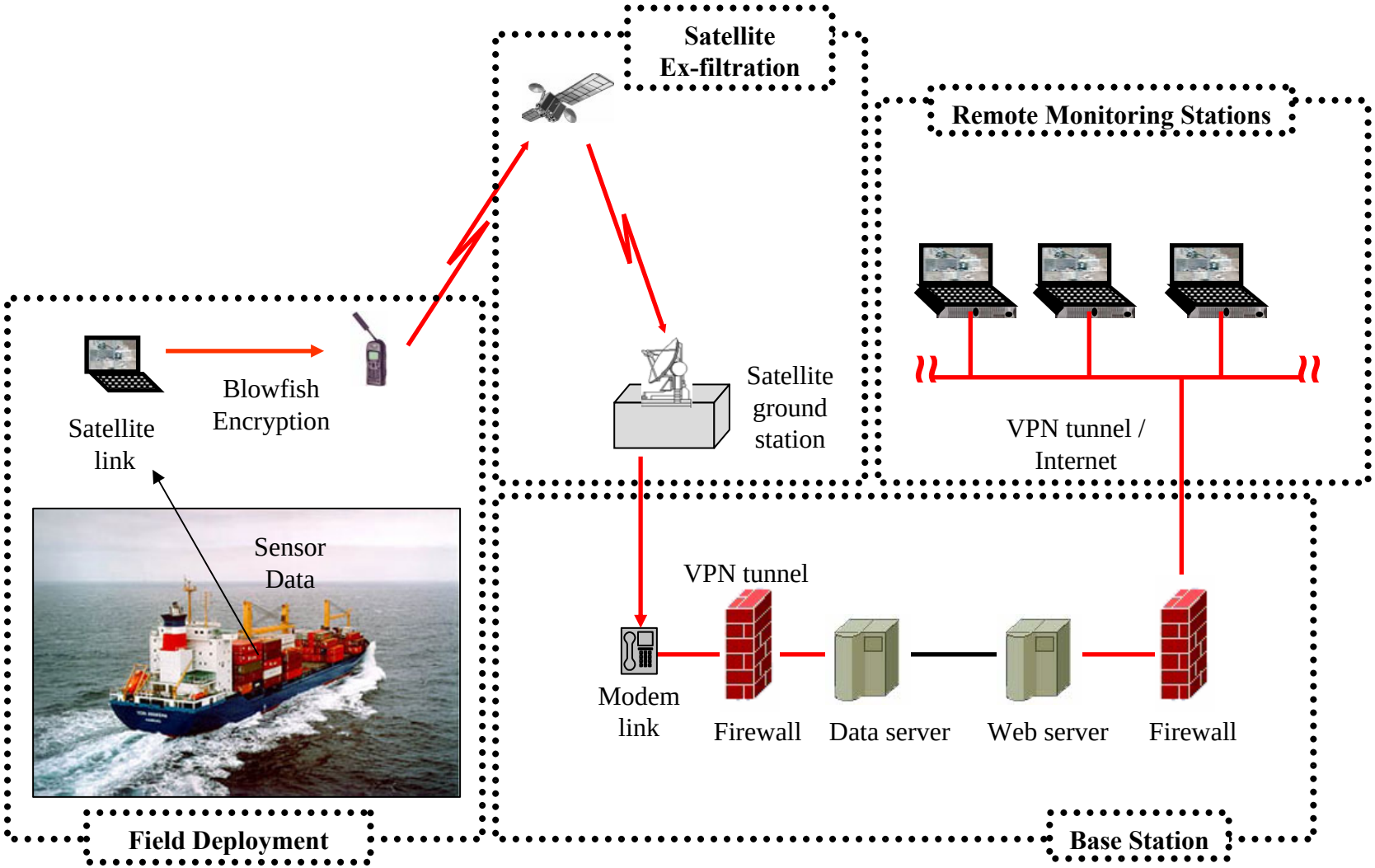
Secure Testing Infrastructure



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Equipment Installation (Mainz) and Cargo Loading (Lollar)

1: Empty Container

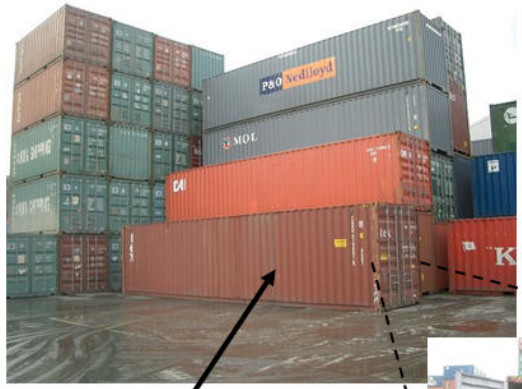
2: Delivery of Equipment

3: Unpacking and Setup

4: Roof Mount Sat/GPS antenna

5: Installation into the Container

6: Final System Setup

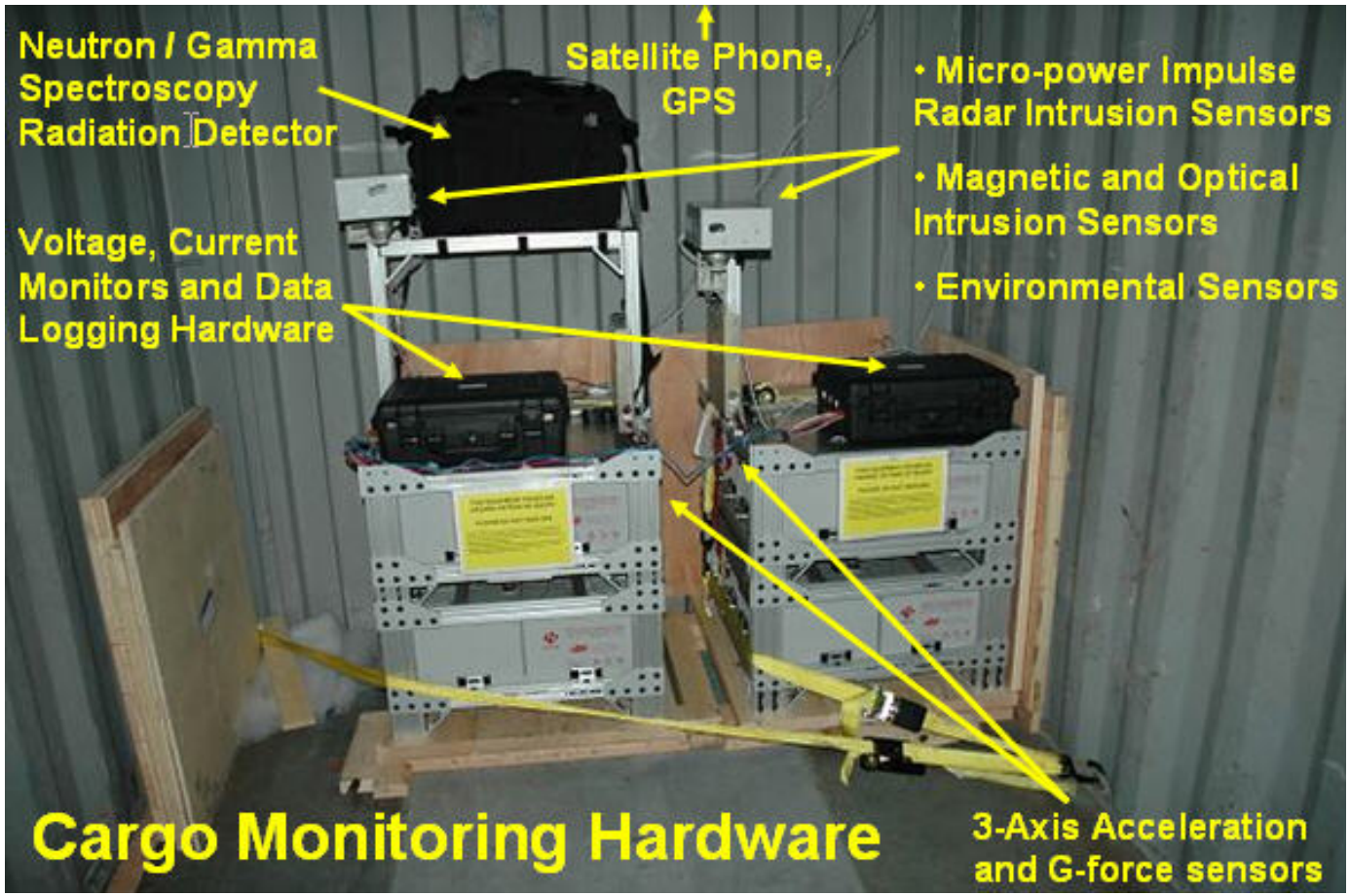


Shipping Container to be Outfitted with LLNL Monitoring System

Loading the LLNL monitored container in Lollar, Germany.

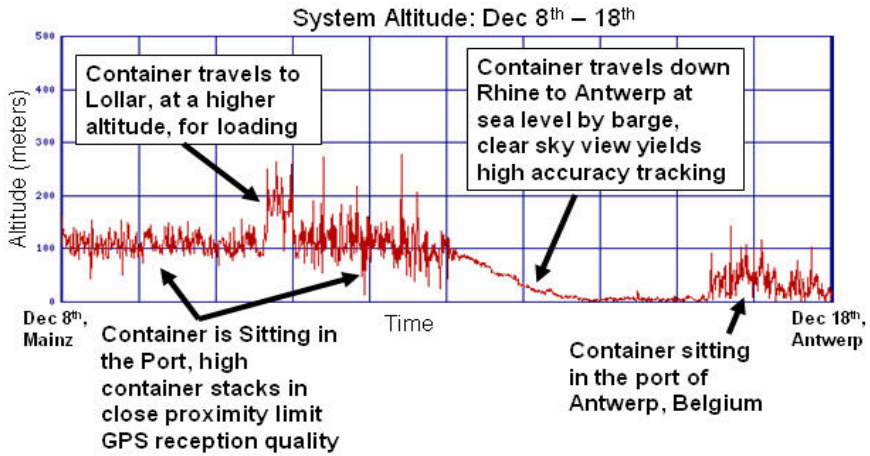
Container loaded and ready for shipping

Cargo Monitoring Hardware



Real Time Tracking

Destination:
4700miles away
Londonderry,
New Hampshire



Origin: Mainz,
Germany

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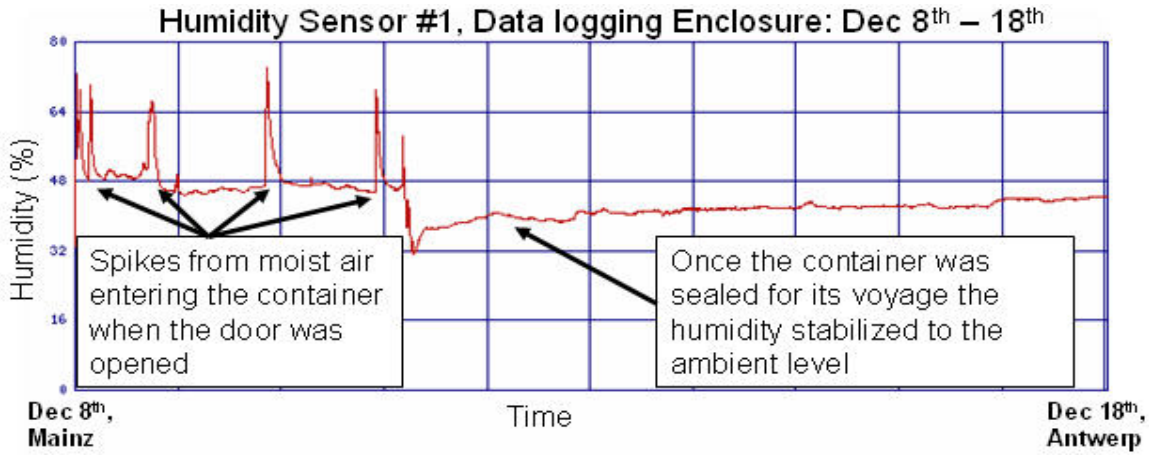
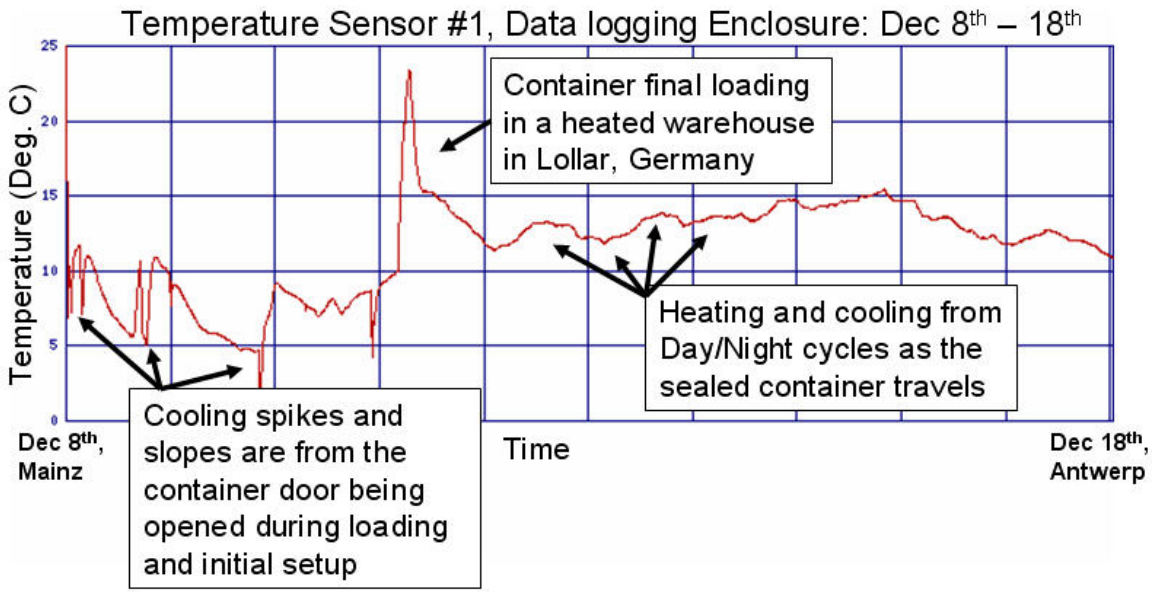
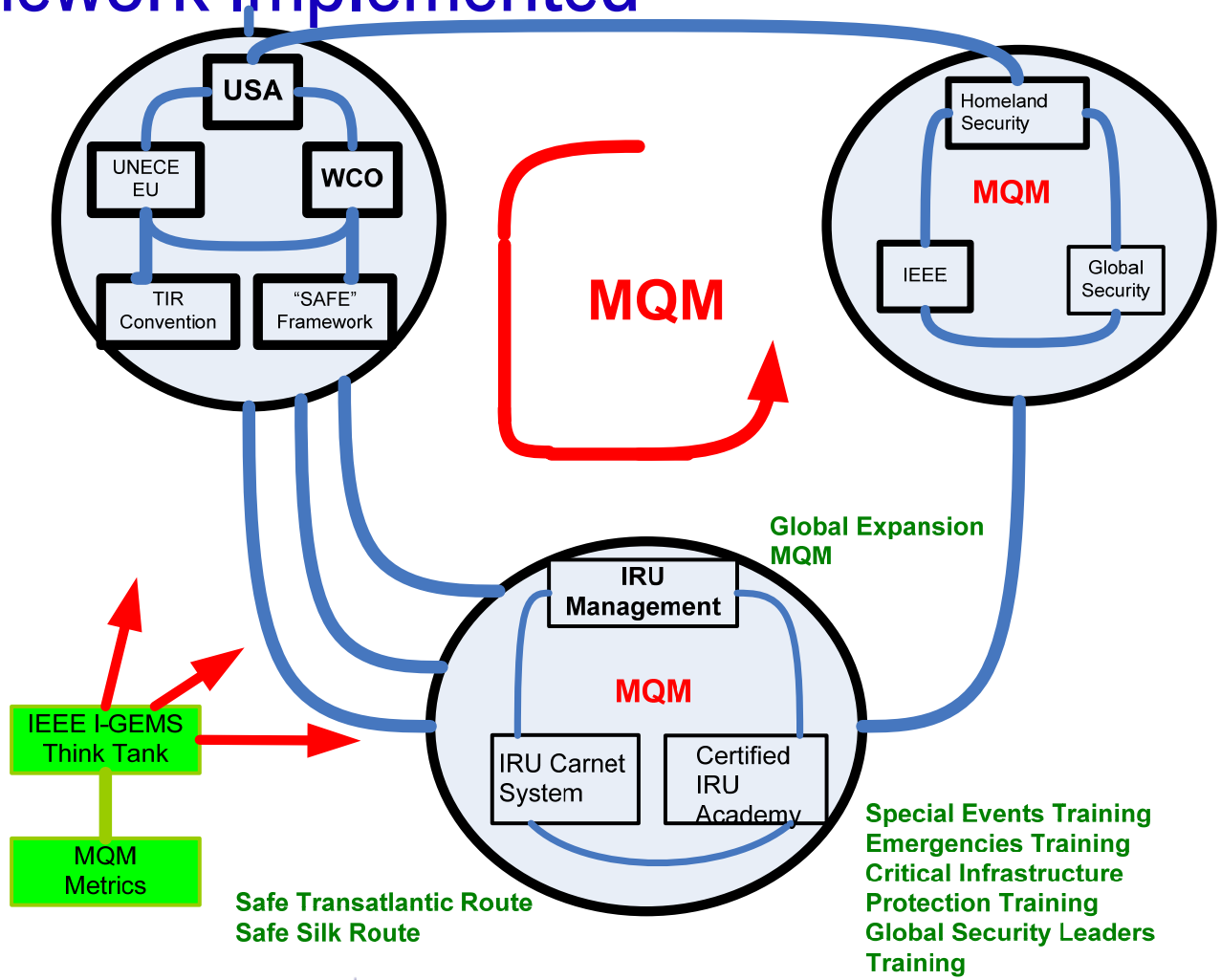
Sample Data


Humidity Sensor #1, Data logging Enclosure: Dec 8th – 18th
Humidity (%)
80
64
48
32
16
0
Spikes from moist air entering the container when the door was opened
Once the container was sealed for its voyage the humidity stabilized to the ambient level
Dec 8th, Mainz
Time
Dec 18th, Antwerp


Temperature Sensor #1, Data logging Enclosure: Dec 8th – 18th
Temperature (Deg. C)
25
20
15
10
5
0
Container final loading in a heated warehouse in Lollar, Germany
Heating and cooling from Day/Night cycles as the sealed container travels
Cooling spikes and slopes are from the container door being opened during loading and initial setup
Dec 8th, Mainz
Time
Dec 18th, Antwerp

Global Security Transportation: Rainbow Framework Implemented



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Global "All Hazard" Security Engineering

- All Hazard **Risk Management** is the Essence of Global Engineering i.e. Determines Design Specs for Global Security Systems
- Communication and **Transportation** is the Nerve System of Global Security
- Microelectronics and Embedded Systems are the Nerve System Allowing Global Health Monitoring and Control
- Global Security Engineering as a New Scientific Discipline
- **eTIR** and **Computerized Documentation** Housekeeping are Exemplary Applications

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