State of relevant technology for container security in Europe

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Main issues in container security

- Smuggling people
- Smuggling weapons
- Smuggling drugs, cigarettes
- Avoiding customs duties and quotas
- **Greatest Fear:** use containers for transporting Weapons of Mass Destruction (WMD) and Chemical, Biological, Radiological and Nuclear (CBRN) materials

IPSC work in container security

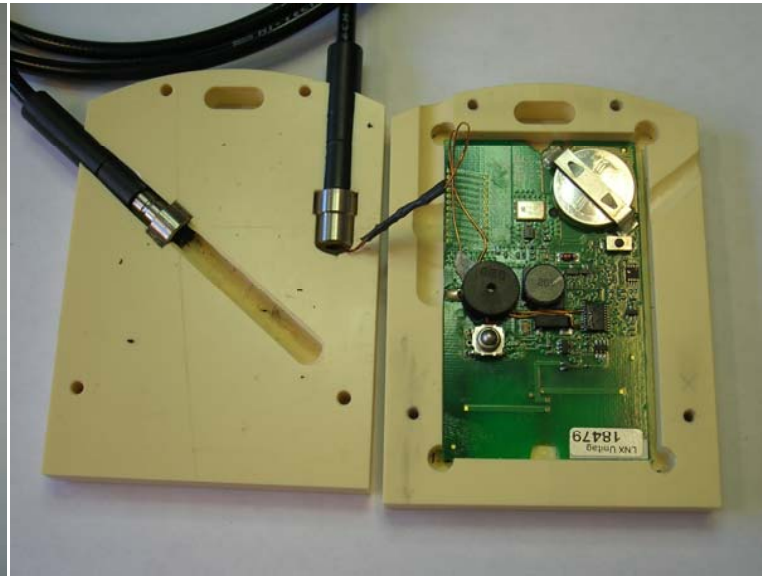
- **Hard approach**
  - Tracking
    - Mechanical **seals**
    - Tracking systems with active/passive RFID e-Seals
    - Smart Container, with intrusion detection
  - Detection
    - Scanning **portals** for nuclear materials & explosives
- **Soft approach**
  - **Web-Based Maritime Intelligence**

ConTraffic

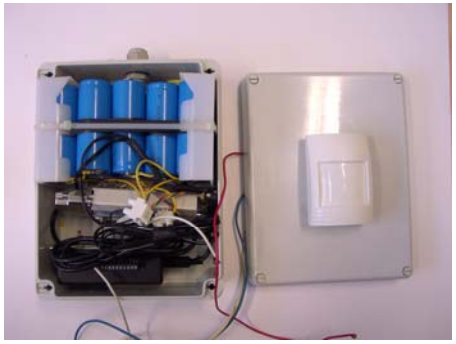
***Con**tainer **Traffic** Monitoring System*

Active eSeals

- JRC is developing a new smart seal, based on active transponder, able to transmit a signal in a range of 30 meters



- The seal communicate to the container Integrated Alarm System (Smart Container), to avoid a dedicated seal reading infrastructure



- The JRC seals are undergoing a test phase with Chinese customs and Italian customs authorities

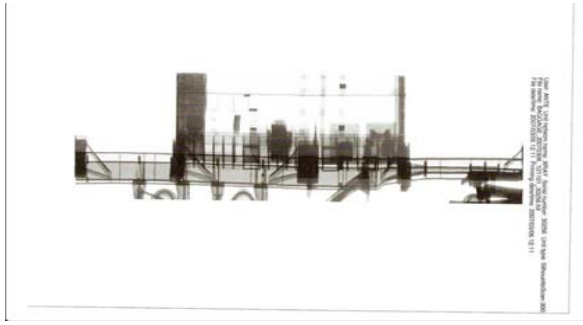
Seals

- **Mechanical seals** are vulnerable: It is quite easy to open the main container door leaving seals in position
- **Electronic seals** are quite expensive, especially in terms of infrastructure and logistics.
- Seals give a **false feeling of security**
- Containers must be **loaded and sealed** in a controlled way

Scanning portals: EURITRACK project

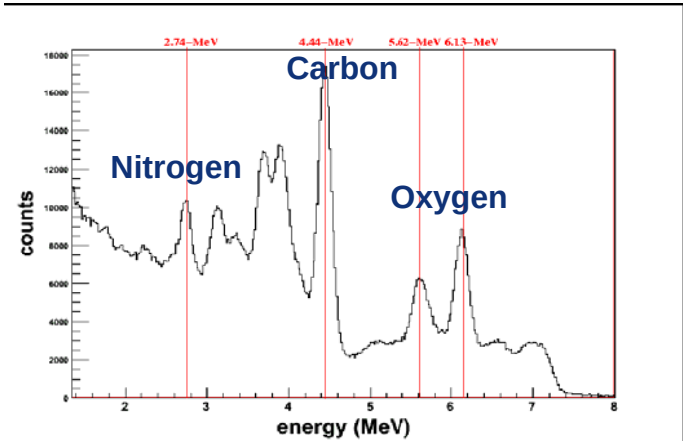
X-Ray systems provide only limited information:

- Give an indication of **shape** and **density** of the objects
- Cannot identify chemical elements



Active neutron interrogation could:

- Identify **elements**
- **Peaks ratios** allows to detect **Explosives** & **Drugs**
- Possibly detect **nuclear material**

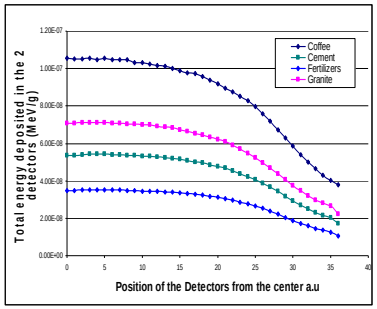


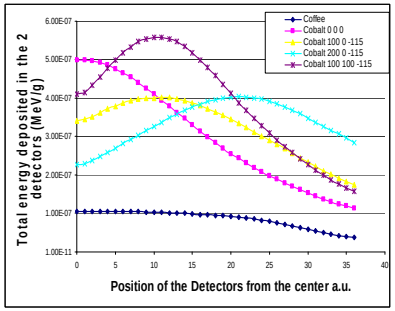
The principle:

- Neutrons from a pulsed neutron generator induce in the material inelastic reactions followed by the emission of photons whose energy is characteristic of the element
- Photon spectrum analysis allows **elements identification**

Scanning portals: false alarms

Naturally Occurring Radioactive Materials (NORM) such as rocks, minerals, metals processing slugs, coal fly ash, fertilizers, ceramics and many commercial items which are transported in big quantities in containers, can trigger **false alarms**



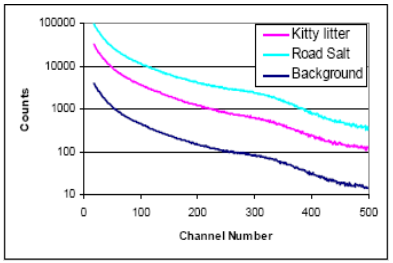


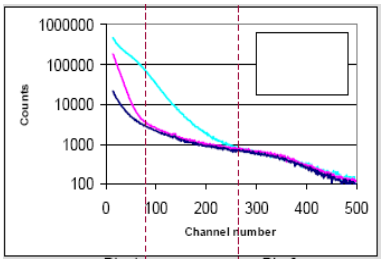
- Spatial profile (coupling the time evolution of the detector response with truck speed)

  and

- Broad Energy Windowing (energy profile)

  can be used for **discrimination** between NORM and dangerous nuclear cargos





Scanning portals

Scanning portals are, however

- Slow
- Large
- Expensive

And often give false alarms

Web-Based Maritime Intelligence

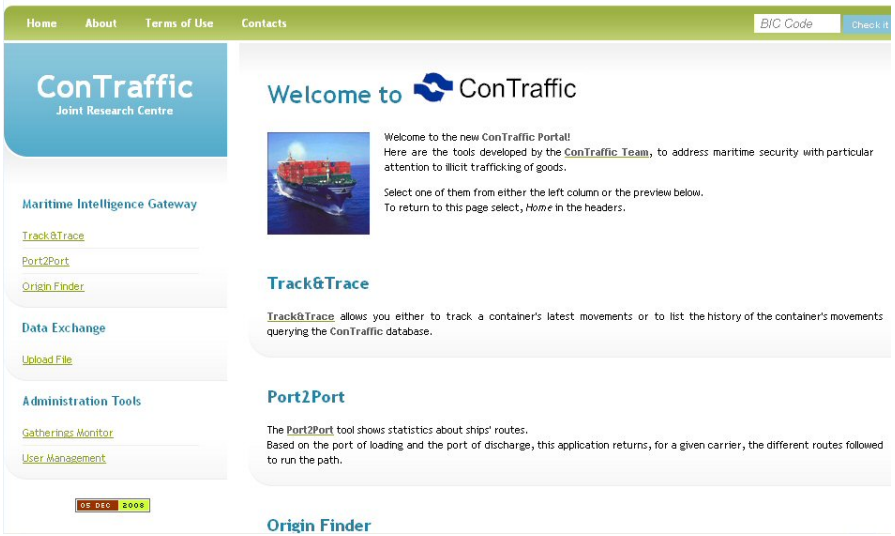
Cyclic interrogation of web based corporate tracking systems

Construction of database with time series of container positions and route data

the ConTraffic database

Identification of containers following **“atypical”** sea-routes

ConTraffic



- Origin estimation
- Loop identification
- Transshipment pattern
- Calculation of anomaly scores
  - number of transshipments
  - total time spent in transshipment
  - handling time at origin
  - handling time at destination

ConTraffic test results

- Suspicious containers identified by ConTraffic and communicated to customs: ~ 200 (at the time of this exercise the database contained around 1.5 million containers)
- Number of containers actually inspected by customs: 60
- Number of fraudulent containers among these: 22
- Products concerned: chemicals, shoes, textiles, chinaware, ...
- Irregularities: mostly anti-dumping, quota-related infractions

Overall hit rate: 1/3
based on global routing information alone…

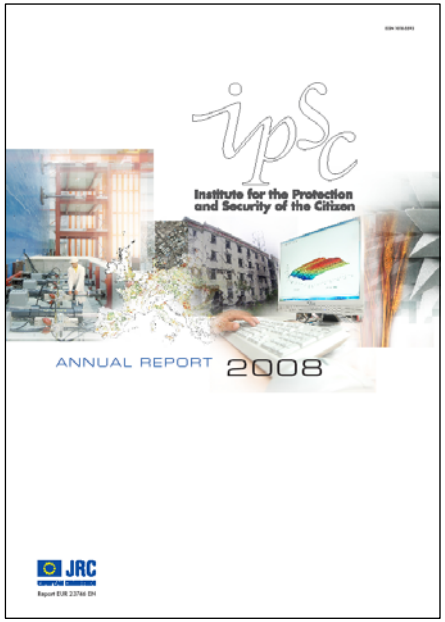
Conclusion

State of the available technologies:

- Sealing not bullet-proof
- Scanning portals far from being viable
- Intelligent analysis can complement

Institute web page

For more information:

http://ipsc.jrc.ec.europa.eu/

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