Radiological and Nuclear Threats - project initiatives and results

Kari Peräjärvi

RN Group Coordinator

Contents

- Nuclear security

- ERNCIP RN-Group initiatives

- ERNCIP RN-Group results

STUK

MORC

nuclear and other radioactive
Material Out of Regulatory Control

There are no orphan sources!

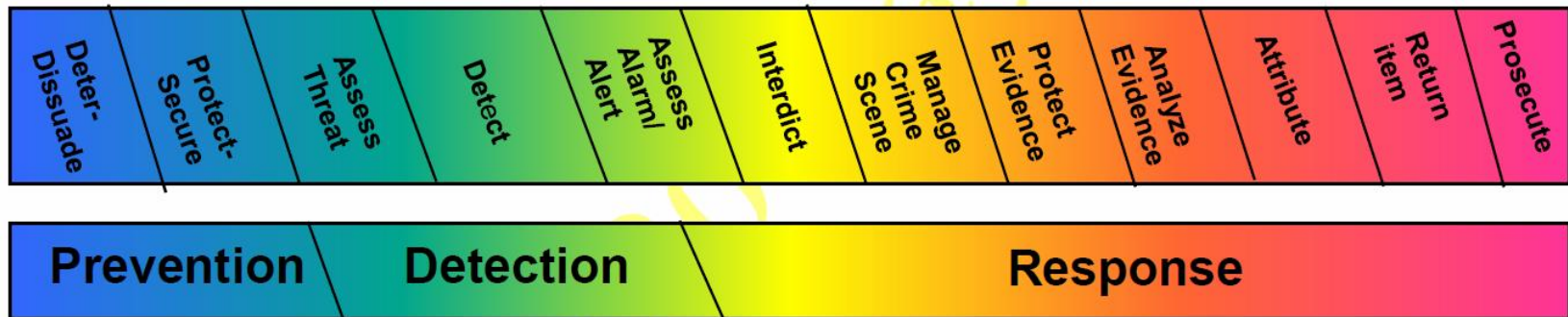Is a child orphan while being victim of kidnapping?

No - the child is out of control of the parents!

Nuclear Security

The International Atomic Energy Agency (IAEA) defines the three fundamental pillars of nuclear security:

1. Prevention
2. Detection
3. Response

The primary goal for nuclear security activities is preventing crime.

# Nuclear security strategic areas of operation

Exterior:

1) Nuclear facilities or facilities that handle radioactive materials in foreign countries
2) Transports between border crossings and facilities in foreign countries
3) Border crossings in foreign countries

Border:

4) Transport from the source country to the destination country
5) Border crossing

Interior:

6) Domestic nuclear facilities or facilities that handle radioactive substances
7) Nationwide observations – transports, transport hubs
8) Detection systems at a stand-off distance from the target
9) Target

STUK
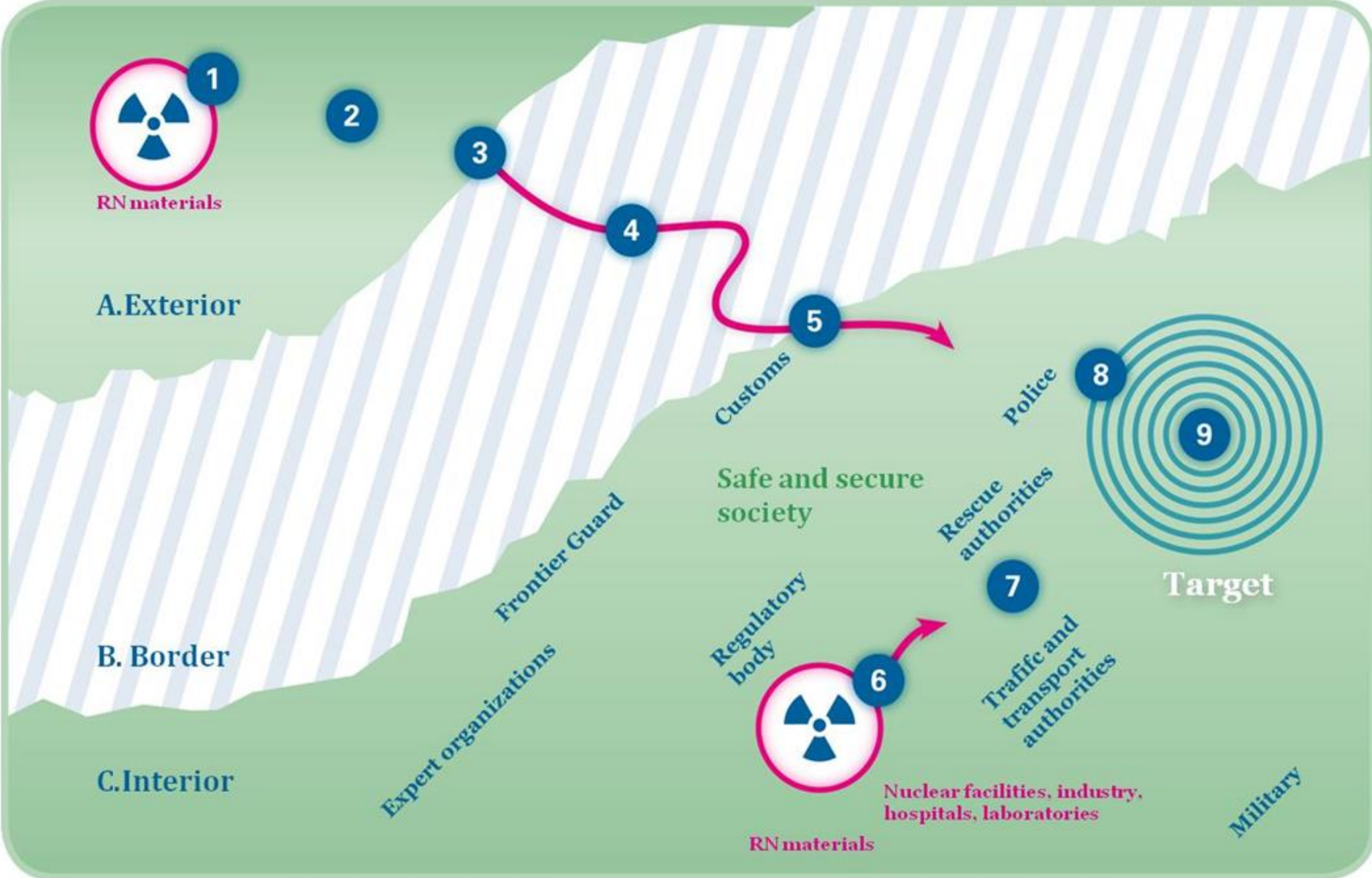
Radiation detection plays a key role in different areas of operation.

ERNCIP RN - Thematic Group

- Concentrates on radiation detection

- During 2013 - 2015 the following three rising subjects are analyzed:

  1) List-mode data acquisition based on digital electronics

  2) Remote expert support of field teams (Reachback)

  3) Remote controlled radiation measurements and sampling using unmanned vehicles (Robotics)

- These topics are relevant for both Nuclear Security and Emergency Management.

- Present number of TG members is 13. Few more may join during 2015.

- RN and robotics communities are represented

- Experts from USA and Canada, with the non-TG member status, have contributed to the Reachback and List-mode topics.

STUK

List-mode 2013-2015

- List-mode data acquisition improves the performance of radiation detection and analysis. Some new gamma and neutron detectors require list-mode data acquisition to function optimally.

- Number of digital list-mode data acquisition system manufacturers is rapidly increasing but common list-mode data format is still missing

- Acute need to standardize list-mode data format was identified. Standardized list-mode data format improves the interoperability of radiation detection and analysis.

- During 2013-2014 a first version of list-mode format was developed.

- List-mode reports produced so far:

  1) List-mode data acquisition based on digital electronics - State-of-the-art report
  2) Critical parameters and performance tests for the evaluation of digital data acquisition hardware

- The Group will still continue with the topic but the actual standardization work will be made in other projects, see the poster made by Jan Paepen.

- WP 2015 includes a survey and its analysis

https://ec.europa.eu/eusurvey/runner/DigitalStandard

Reachback 2013-2015

- Remote expert support of field teams, e.g. transfer of data, rather than moving people or samples leads to faster and higher-quality responses with less people. It also improves real time situation awareness in the headquarters.

- Analysis of reachback topic revealed the importance of agreed formats and protocols for information sharing regarding nuclear events. Work during 2015 and possibly 2016 will pave the way for the actual reachback protocol standardization project.

- Information sharing between countries would become technically straightforward if such standard protocol would be developed. This would be useful in nuclear security and emergency management.

- Reachback reports produced so far:

1) Remote Expert Support of Field Teams - Reachback Services for Nuclear Security

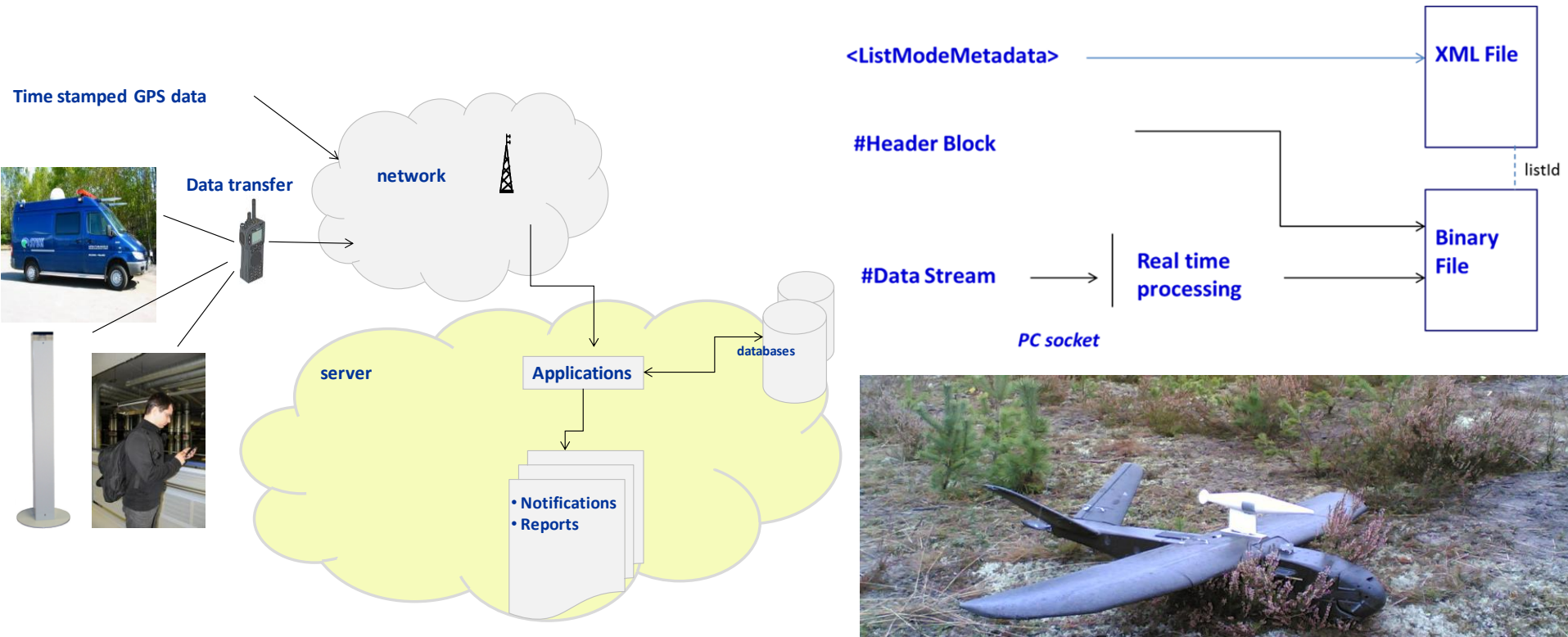- WP 2015 includes a state-of-the-art report, survey and its analysis

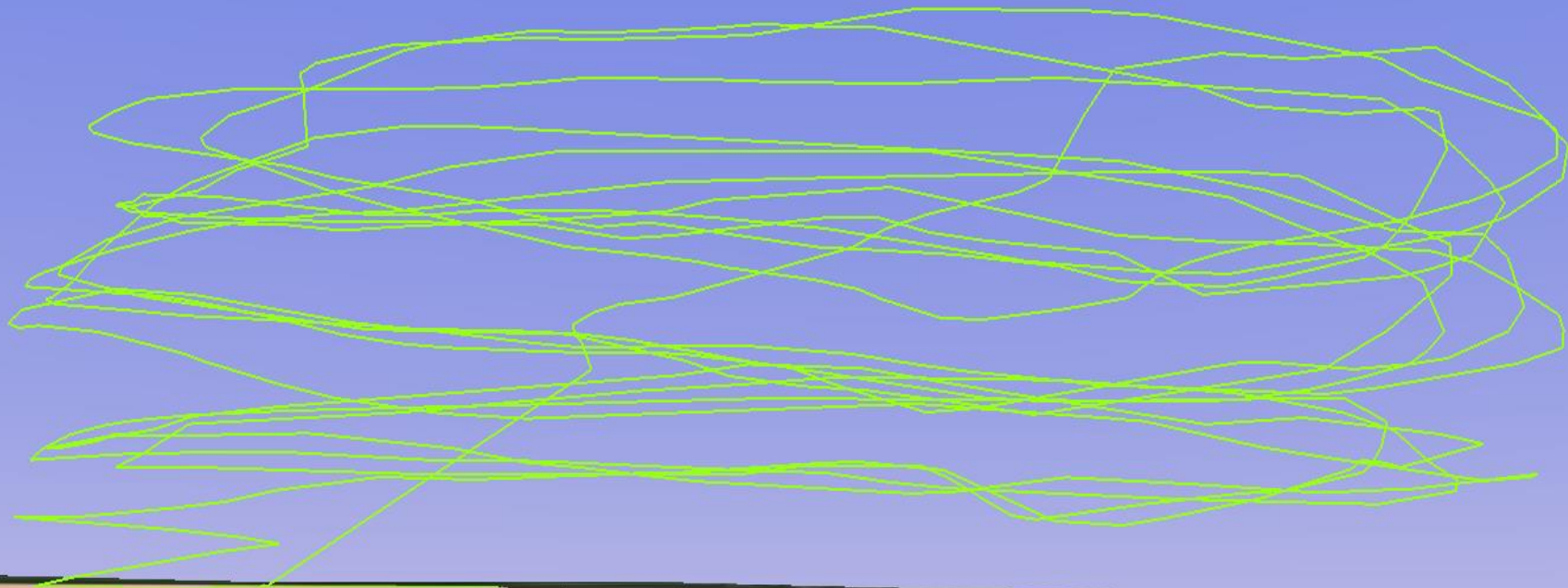REACHBACK IN NUCLEAR SECURITY DEMONSTRATION

Robotics 2013-2015

- The development of robot based RN capabilities are important since there are several measurement

    and sampling scenarios that are too dangerous for humans to carry out.

- Robotics state-of-the-art analysis was made and RN scenarios for robots were developed. It was agreed that it is still too early to start standardizing robot based RN detection and sampling. Instead we need to increase the interaction of robotics and RN communities and promote R&D.

- Reports produced so far:

    1) Current state-of-the-art of unmanned systems with potential to be used for radiation measurements and sampling

    2) Possible scenarios for radiation measurements and sampling using unmanned systems

- WP 2015 includes a survey and its analysis. In addition, we will develop and promote human-robot RN exercises and competitions based on our earlier work on scenarios.

STUK

Deliverables

- Reports produced by the Group can be downloaded from:

https://erncip-project.jrc.ec.europa.eu/networks/tgs/nuclear

Time stamped GPS data

Data transfer

network

server

Applications

databases

- Notifications
- Reports

<ListModeMetadata> → XML File

#Header Block

listId

#Data Stream → Real time processing → Binary File

PC socket

THE END