

ITRAP+10

Illicit Trafficking Radiation Detection Assessment Program

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Illicit Trafficking Radiation Assessment Program

- The growing complexity of modern civilization has created an increased risk of non-conventional radiological and nuclear disasters of an accidental as well as intentional origin. The use of such non conventional materials to commit criminal acts continues to worry societies around the world.
- The **accurate and timely detection** of radioactive and nuclear material is a **key element of any nuclear security strategy**
- ITRAP was a project jointly conducted by the IAEA and the Austrian Research Centre Seibersdorf during the years **1997 to 2000**
- The experience of the first ITRAP resumed what was the state of art of portal, pagers and hand held devices for on-site radioisotope detection and identification.
- This exercise showed the importance of effort combination and collaboration of experts, users and vendors as the most effective way to move ahead in **improving specifications and technology**.
- IAEA specifications first evolved from the tests, later **ANSI and IEC standards** based on the IAEA recommendations **were developed**

- **Nowadays, ten years after the original exercise, with the evolution of the measurement techniques and the increase of the deployment of such equipment, there is a need for an update of such evaluation hence ITRAP+10**

- **Testing and qualifying equipment will not only serve the assessment of the significant gaps between the requirements and performance of the equipment but contribute also to:**
 - Assessment of technology
 - Bring the equipment closer to the required performance
 - Provide feedback on the test Procedures and Standards
 - Launch new R&D projects that bring new equipment and new software and advanced technology in the field of the detection and the identification of nuclear materials.

In the frame of an Administrative Arrangement between **DG JLS and JRC**, the ITRAP+10 project will carry out an **evaluation and comparison of the performance of available detection equipment relevant to nuclear security**.



Instrument families to be tested

- RPM (Radiation Portal Monitors) for Vehicles**
- SRPM (Spectrometric Radiation Portal Monitors)**
- PRD (Personal Radiation Detectors)**
- SPRD (Spectrometric Personal Radiation Detectors)**
- RIID (Radiolotope IDentifier)**
- GSD (highly sensitive Gamma Search Detectors)**
- NSD (highly sensitive Neutron Search Detectors)**
- PRS (Portable Radiation Scanners – Backpack type)**

Objectives:

The overall scope of this project is to assist Member State organizations in effectively detecting radioactive materials crossing their borders illegally, whether importations, exportations, or shipments in transit **by developing recommendations that describe the technical and functional requirements for the selection of border monitoring equipment** so that resources are deployed in an efficient way.

The results will provide an independent assessment of the available radiation detection equipment on the market which will serve as a reference for regulatory and other Member State authorities to identify equipment and or families of equipment to address their particular needs, and help to ensure **common standards at a European level.**

In addition, the manufacturer will get recommendations to improve performance, reliability and user-friendliness of the equipment.

Principal International Partners

Due to the global relevance of this project, a **joint program** has been initiated with the **US Department of Homeland Security** - Domestic Nuclear Detection Office and the US Department of Energy which may be carried out in some US National Laboratories.



Homeland
Security

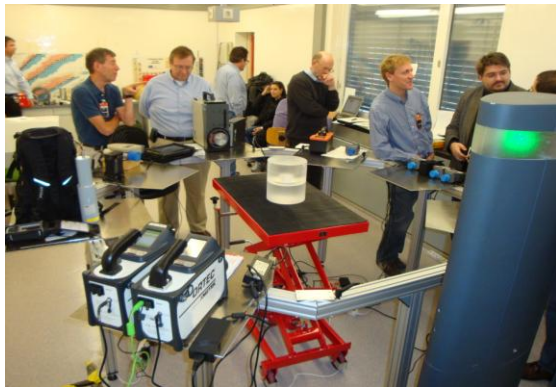


The **IAEA** was strongly involved in the first ITRAP and has confirmed their intention of **participating** in the new edition.



Project organized through three Calls for Expression of Interest:

1. CEI to invite **Companies** to take part in the project
2. CEI to select **European Experts** to Collaborate with JRC
3. CEI to select **European Laboratories** to hold some of the tests carried out during the project.



1. “Call for Testing” to invite companies to participate to the project (Published in March 2010 – deadline for application December 2010)

Ref to official journal [2010/S 59-086876](#)

This call contains the following information:

- Objectives of the project
- Location and tentative planning for the test campaign.
- Brief description of the test
- Eligibility criteria for companies
- Selection criteria for the instruments
 - General conditions
 - Specific requirements: Minimum technical specifications
- Selection process
- Economical conditions (who will pay what)
- Insurance conditions
- Submission of applications

2. “Call for expression of Interest” for the partner laboratories (Published in March 2010 – deadline for application December 2010)

Ref to official journal [2010/S 59-086878](#)

The objective is the creation of a **short list of European Laboratories** having experts in testing Nuclear Security Instruments

The selection will be mainly based on the CV of the experts proposed by each laboratory and infrastructural capabilities.

The JRC will sub-contract some of these laboratories to take part during the test preparation and the test campaign.

3. “Call for expression of Interest” for EU Nuclear Experts (Published in March 2010 – deadline for application December 2010).

Ref to official journal [2010/S 59-086878](#)

The objective is the creation of **two short lists** of European Nuclear Experts in designing test procedures/standards and/or in testing Nuclear Security Instruments

The selection will be based on the **CV of the experts**

The JRC will sub-contract some of them to take part during the test definition and during the test campaign in Ispra

4. Establishment of the test procedures

Revision of the existing international standards in order to identify applicable test procedures for each family of instruments used in border monitoring and/or to develop such procedures where missing.

Test of the Test Procedures

(task finalized by the first quarter of 2011)

4. Establishment of the test procedures (II)

Test procedures are:

- Instrument specific
- Uniform structure
- Requirements and test methods
- Based on ANSI and IEC standards
- Fit both
- Stronger requirement was chosen

<i>Family of equipment</i>	<i>Standards Reference</i>
RPM for Vehicles (Radiation Portal Monitors)	IEC 62244 IAEA NSS1 (2006 & Rev.1)
SRPM (Spectrometric Radiation Portal Monitors)	IEC 62484-FDIS IEC 6224 IAEA NSS1 (2006 & Rev.1)
PRD (Personal Radiation Detectors)	IEC 62401-FDIS IAEA NSS1 2006
SPRD (Spectrometric Personal Radiation Detectors)	ANSI N42.48
RID (Radiolotope Identifier)	IEC 62327 IAEA NSS1 (2006 & Rev.1)
GSD (highly sensitive Gamma Search Detectors)	IEC 62533
NSD (highly sensitive Neutron Search Detectors)	IEC 62534-FDIS
PRS (Portable Radiation Scanners – Backpack type)	ANSI N42.43 IEC 62327 IAEA NSS1 Rev.1

5. Test of the Instruments

- In order to guarantee the comparableness of the results, tests will be performed **contemporaneously** to all instruments of the same family.
- In order to guarantee the confidentiality of the results, **companies will not be present** during the tests.
- A **second round** of tests will be scheduled to avoid rejecting instruments due to small fails.

(First test campaign planned by second quarter 2011)

5. Test of the Instruments (II)

General requirements

- Size and mass
- Controls
- Displays
- Alarms
- Batteries and battery lifetime
- User interface
- Spectral identification (if provided)
- Data format and communication interface

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Radiation detection and response

- Rate of false alarms
- Time-to-alarm
- Effective range of measurement or indication
- Accuracy
- Over-range response
- Detection of gradually increasing gamma radiation levels
- Personal radiation alarm
- Gamma Response of Neutron Detector (if provided)
-

Identification performance

- Radionuclide categorization
- Single radionuclide identification
- Simultaneous radionuclide
- Masking
- Response to an “unknown” radionuclide
- Over-range characteristics for identification
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Non Radiological tests

- Mechanical
- Environmental
- Electromagnetic

5. Test of the Instruments (III)

Compliance of equipment with the **international standards** is an important aspect of the analysis of **state-of-the-art** of detection capabilities, but **not fully exhaustive**

A series of **supplementary tests** not required by standards, explicitly conceived to derive the maximum capabilities and the limits will be designed and performed.

- *Detection Limits*
- *Identification Limits*
- *NORM rejection capability*
- *Masking scenarios*
- *Realistic cargo loadings*
- *Area network capability*

5. Test of the Instruments (IV)

Data Acquisition System to be used for running the tests (DCS):

- Developed by DNDO
- Does the planning of the test
- Follows up in real time the execution of the test
- Collects the data and stores them for future documentation:
 - Conditions of the test
 - Results of the test
 - Operator of the test

5. Test of the Instruments (VI)

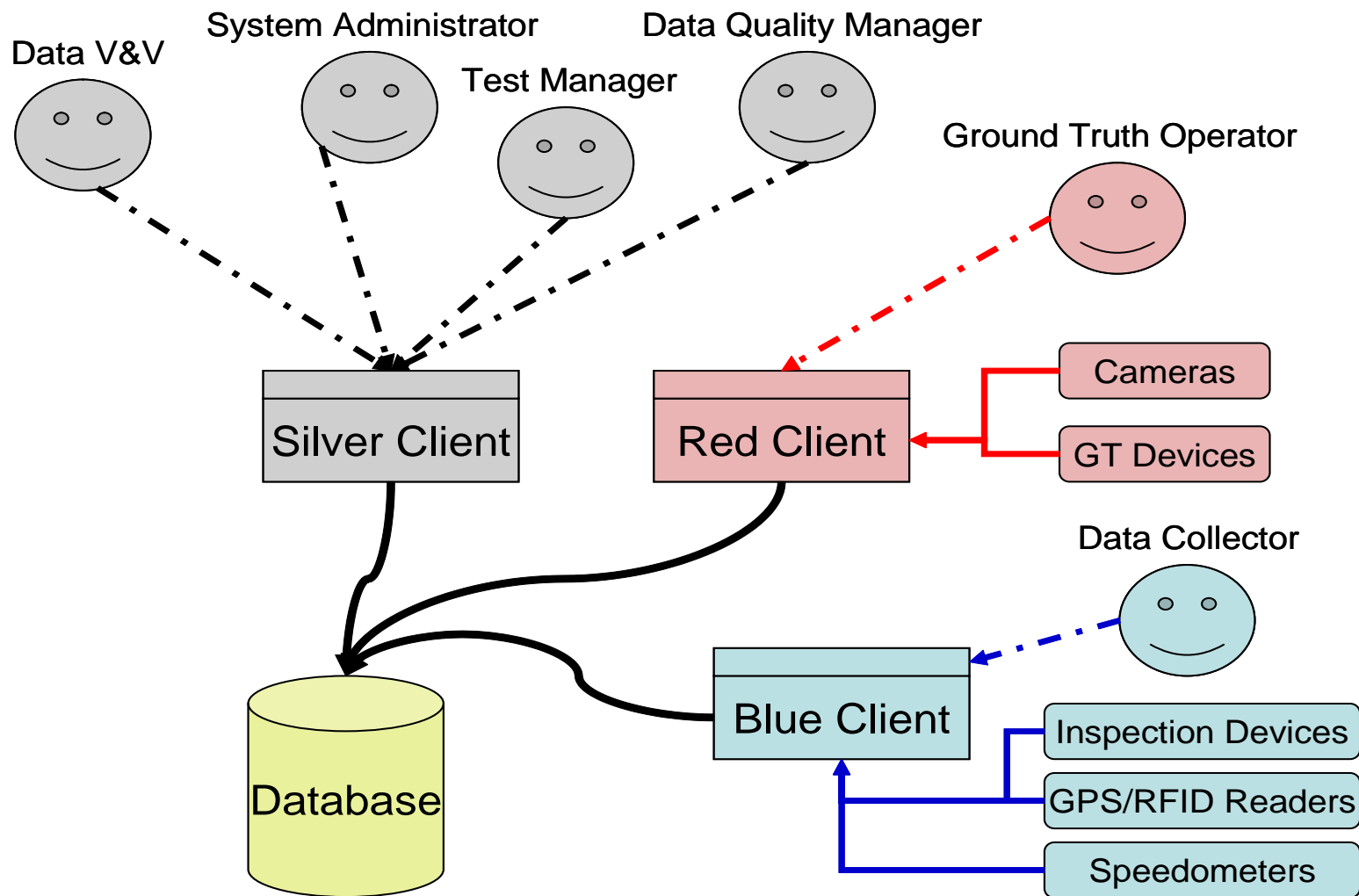
The Data Collection System uses a three “team” approach to testing and data collection.

- The **Silver Team** is responsible for **setting up the test**, entering the details of the test plan into the database, configuring the system, providing quality control and managing the data after the test.
- The **Red Team** is responsible for physically setting up test trials and entering the **ground truth** data into the database (**tests conditions**)
- The **Blue Team** is responsible for **operating the inspection devices** and recording the results of each inspection as well as all other **results data**.

The Data Collection System enables the test team to configure what data will be collected for both ground truth and results; facilitating use in testing a wide variety of devices in different scenarios.

5. Test of the Instruments (V)

DCS System Architecture:



Reporting to the companies

- Participants will receive a **personalized test report** containing a ranking of the instruments but without indentifying equipments (**Blind report**). Each one will know only their own “nickname”.
- The report will include:
 - The description of the tests performed
 - Detailed individual tests results per equipment
 - Aggregate results per family
- The **certification of the BM equipment is NOT the objective** of the project.
- Participants will receive an “official recognition of the participation in the ITRAP+10”.

Results

- **Guidelines** to be used as **Technical Specifications** by MS when purchasing detection equipment relevant in the Nuclear Security field.
- **Testing procedures** ready to be implemented.
- **Feedback** about the requirements included in the international **standards**.
- **Feedback** to the **companies** about their instruments and how to improve them.
- **Other spin-offs** such a **network** of EU nuclear laboratories ready to implement the testing procedures are desirable.