



# Effective Container Inspection at BORDER Control Points

## Project Rationale:

- Efficient NII (non-intrusive inspection) of containerized freight is critical to trade and society
- Freight containers are potential means for smuggling, drug trafficking, and transport of dangerous / illicit substances
- NII technologies used today cannot cope with all targets under all circumstances with equivalent efficiency

## Project Goal:

C-BORD will increase interdiction of illicit or dangerous material in containerized freight and deliver new capabilities against critical operational requirements and constraints:

- Increased throughput of containers per time unit
- Reduced need for costly, time-consuming and dangerous manual container inspections
- Lower false negative and false positive alarm ratios
- Operationally significant health & safety, logistics, cost and benefits issues

## Project Approach:

- C-BORD develops five technology pillars to enable next generation container NII at EU sea and land borders
- Proof of capability through live field trials in three use cases under real conditions at different border control points
- A C-BORD Toolbox and Framework to help customs analyse needs for container NII, design integrated NII solutions, optimize the interdiction chain, and provide a systemic response to key functional, practical, logistical, safety and financial questions to support deployment.

## C-BORD Toolbox: Complementary Innovative NII Technologies

### Advanced Radiation Management



- Radiation detection, classification & ID
- Fixed, relocatable and mobile solutions
- Resilience to masked nuclear threats
- Reliable discrimination of natural radiation

### Evaporation Based Detection



- Evaporation based detection of illicit drugs and chemical agents in cargo containers
- Complementary to X-ray imaging
- Biosensor arrays, highly sensitive transducers and machine learning to allow enhanced selectivity
- Appropriate sampling and pre-concentration technologies to increase sensitivity

### Tagged Neutron Inspection System



- Position sensitive detection of explosives, illicit drugs and chemical agents
- Identification of elemental chemical composition
- Crucial progress of Tagged Neutron Inspection in terms of size, complexity and costs
- Development of relocatable system for test and validation in a real port environment

### Next Generation Cargo X-Ray



- Improved material classification in the organic range
- Chemical separation of overlapping objects
- Chemical discrimination for low dose systems
- Global X-ray image improvements

### Photofission



- Direct detection of Special Nuclear Material (SNM), uranium, plutonium
- Strong association between high-energy imaging and photofission techniques
- Test and validation in first EU photofission port installation



Proof of capability through live field trials in three use cases under real conditions at different border control points





enabling  
next generation

cargo  
screening

by an effective  
**synergy**  
between...

## Technology Providers



Development for Photofission, TNIS, Passive Detection, Evaporation Based Detection



Electronics subsystems for Photofission and TNIS



Measurement methods, detectors for Photofission and TNIS  
Organisation of "Rapidly relocatable checkpoint" field trial



UNIVERSITÀ  
DEGLI STUDI  
DI PADOVA

Development of Rapidly Relocatable TNIS



Micro-cantilevers, electronic interface for Evaporation Based Detection



The University of Manchester

Sensors, software, hardware, integration for Evaporation Based Detection



Bonn-Rhein-Sieg University  
of Applied Sciences

Testing , assessment , recommendations for standards Evaporation Based Detection  
Small and large volume sampling system  
Standardised Emission sources



Development of enhanced mobile & re-locatable radiation detection  
Detectors for Photofission and TNIS  
Data fusion



bringing technology to life

Container Inspection Systems -  
X-ray technologies  
Integration user interface, data fusion & decision making

## End Users

User requirements for NII technologies and assessment

Real environment test sites for use cases:

◆ **Fully automated seaport**  
Rotterdam , The Netherlands

◆ **Rapidly relocatable checkpoint for ports**  
Gdansk , Poland

◆ **Mobile checkpoints**  
Hungary



National Tax and  
Customs Administration



## Experts & Service Providers



Project management  
Dissemination & exploitation support



C-BORD Framework  
Port logistics, workflow, cost & benefit considerations  
Testing, assessment, standards recommendations for passive detection and TNIS



Benchmarking of advanced passive detection systems  
Laboratory tests of TNIS



Testing, assessment, standards recommendations for x-ray and photofission  
Organisation of "mobile checkpoints" field trial



Ethics monitoring

TNIS: Tagged Neutron Inspection System  
NII: Non- Intrinsic Inspection

