

Gamma spectrometry as a tool for global disarmament

Building an Information barrier (IB)

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The race for disarmament



The UK –Norway Initiative on Nuclear Warhead Dismantlement Verification

Project Objectives

Project goals:

Develop new technologies, methods and procedures for the verification of future multilateral and bilateral disarmament treaties

Project Partners:

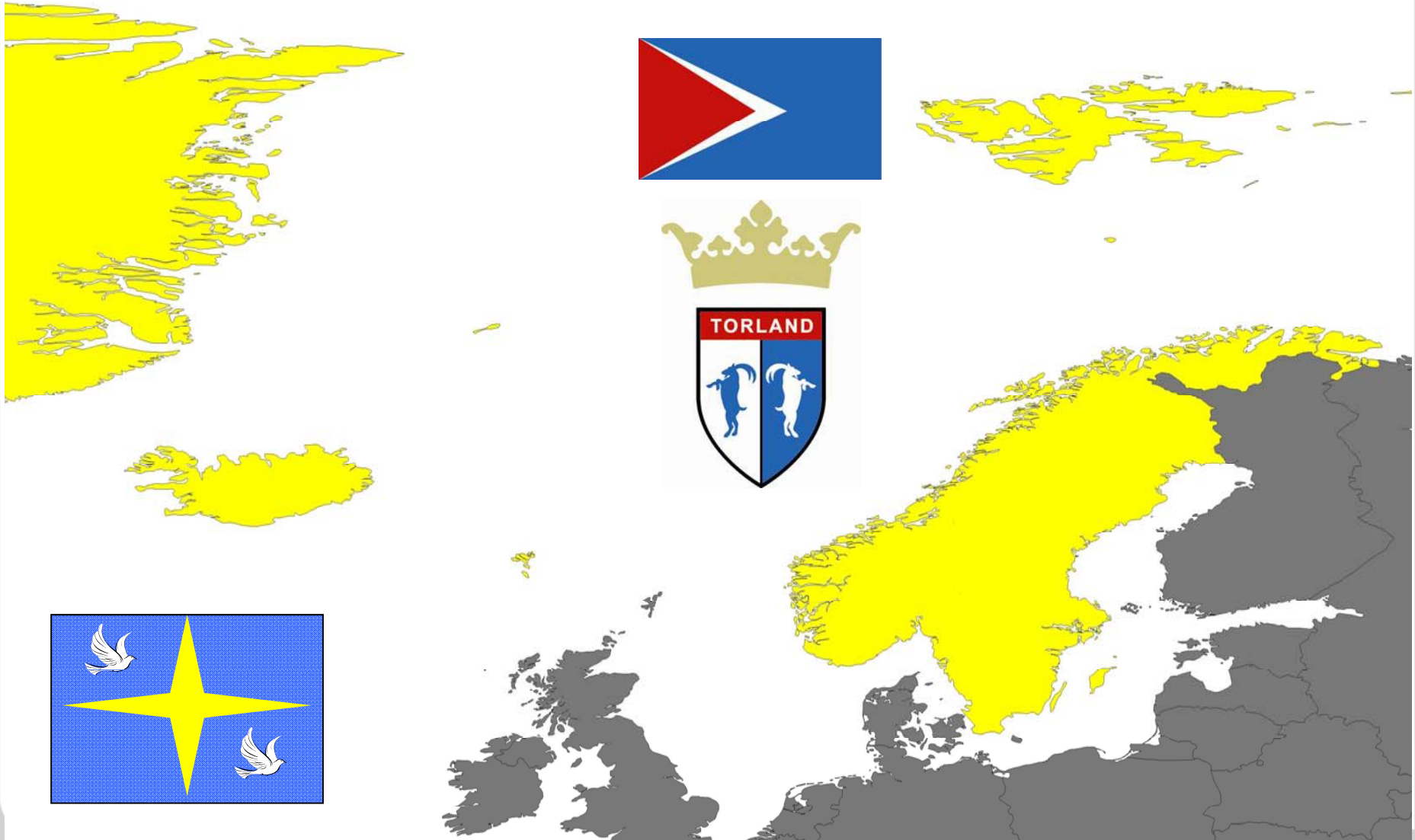
- UK: MoD, AWE
- NOR: FFI, IFE, NRPA, NORSAR



The Project has two elements

- **Development of verification methodologies**
 - Exercise inspections of a mock-up ‘nuclear weapons complex’ in the course of verified dismantlement of a mock-up nuclear weapon
- **Development of IB system**
 - A tool needed for successful implementation of a chain of custody without revealing weapons attributes and characteristics

Thorland inspected by Luvainia



The exercise I



The bomb is received

The IB has been used to verify that it is a nuclear warhead



The IB is used to check the warhead inside the container



Ready to remove the physics package

The exercise II



The physics package is ready for transportation and final storage



The IB is used to maintain a unbroken chain of custody from reception to final storage.

Well done!



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Assumptions for the IB Project



- Solution will only be trusted through joint development
- Complex equipment/computing will be hard to authenticate.

Need to keep the design as simple as possible

The Black Sea Experiment

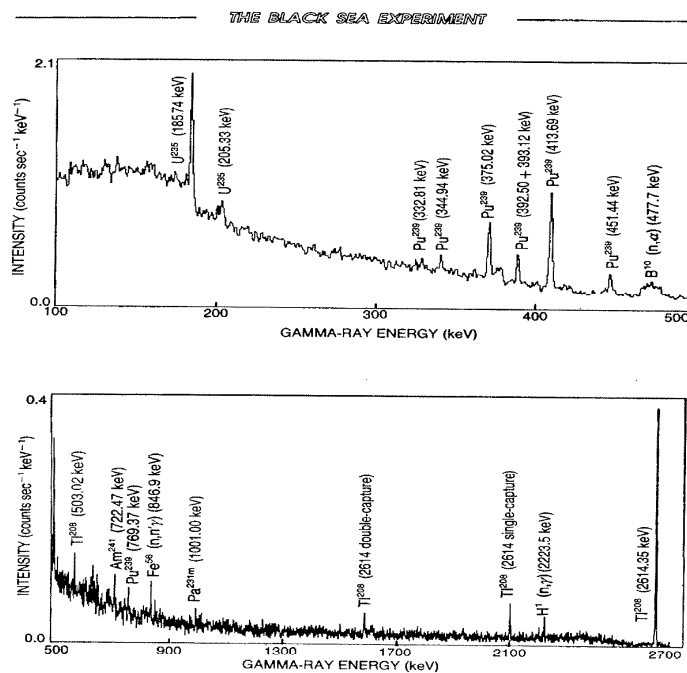


Figure 1: The gamma-ray signal recorded by a germanium detector placed on top of a cruise-missile launcher 3.4 meters from the lid for 10 minutes

On 5 July 1989, in a remarkable display of military glasnost, a team of US and a team of Soviet scientists measured the radiation emitted by the nuclear warhead of a cruise missile aboard the Soviet ship Slavs.

The challenge

How do we build a box that:

- * Both sides will trust
- * Gives the agreed information
- * Hides the rest
- * Is transparent and can be verified
- * Is as simple as possible

Yes, we understand that you have a nice instrument ...But we'll build our own.



Technical Approach

Use of a surrogate material - Co60.

Addresses all relevant technical challenges without proliferation issues.

Start with the initial problem of *material presence*.

Starting point of high resolution gamma spectroscopy –
Measurements of high confidence and less chance for being fooled.

The Information Barrier prototype



Mobile
Battery operated



MCA
DC power
HT power



Ge -detector

The Information Barrier prototype

The Norwegian
prototyp
ASSEMBLY



The UK
prototype
ADA/SPARK



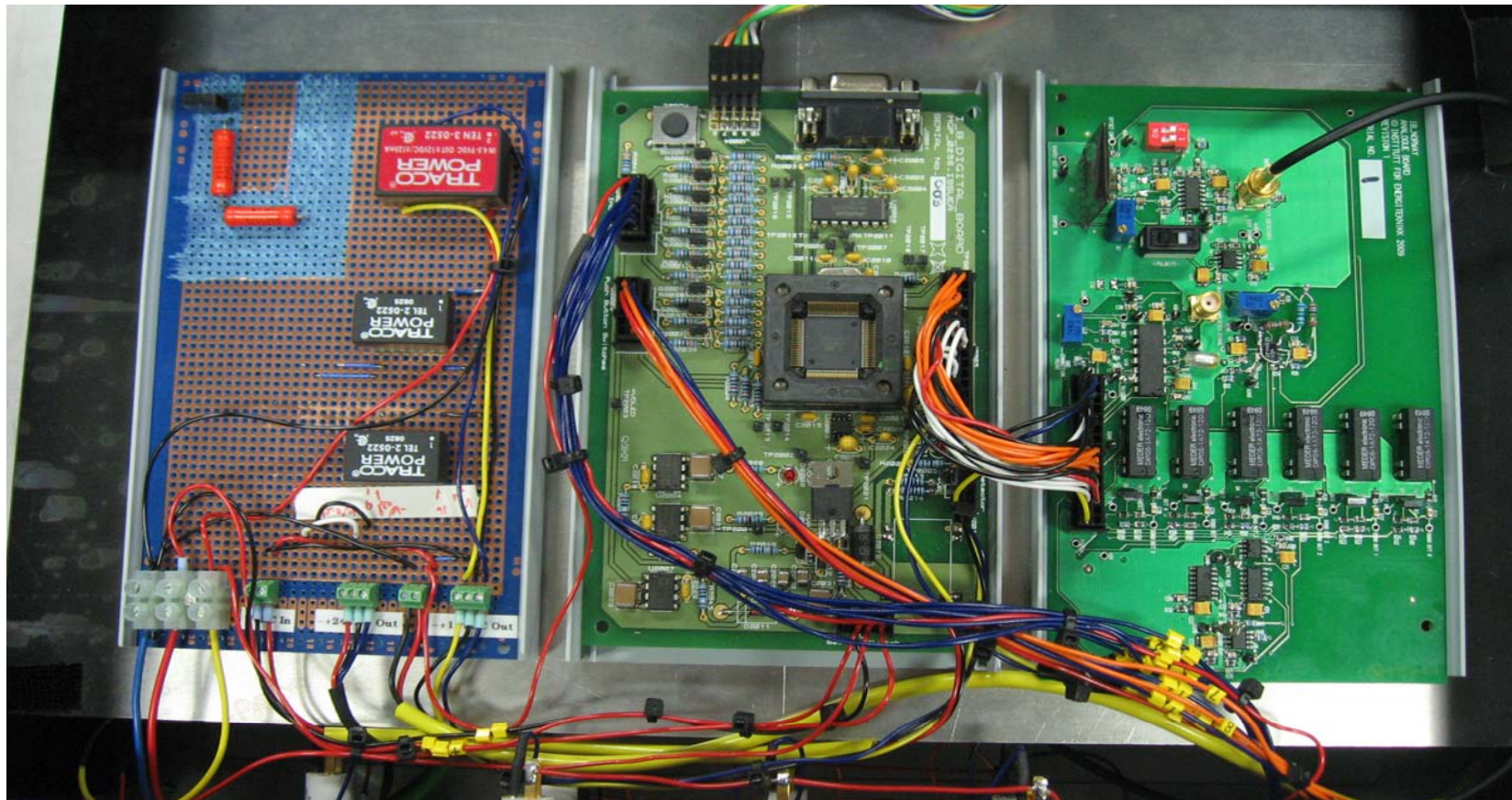
The black beauty



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The Information Barrier



DC Power

Digital card

Analog card

Information Barrier summary

An Information Barrier in its simplest state takes data from a measurement device, processes the data and provides a pass/fail answer to a predetermined criteria.

The information barrier must protect the measurement data from being released to the operating parties.

The information barrier is only as good as the level of trust in it by the parties involved.

Thank you.