IAEA Safeguards

FRÉDÉRIC CLAUDE
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International nuclear safeguards

A system designed to provide assurance about the exclusively peaceful use of nuclear material and facilities

A brief history: 1946-1970

- Baruch Plan 1946 proposal to bring atomic energy under UN control - dropped
- Eisenhower Atoms for Peace speech 1953 – proposals formed basis of Statute of IAEA, established in 1957
- First safeguards agreement concluded 1959
- First safeguards inspection 1962
- First comprehensive set of safeguards 1965-67

Non-Proliferation Treaty (NPT)

Open for Signature: 1968
Entry into force: 1970

Non-Nuclear Weapon States

- Full access to peaceful uses of nuclear energy in return for nuclear weapon abstinence
- Safeguards to prevent diversion from peaceful uses
- Security assurances

Nuclear Weapon States

- Commitment to nuclear disarmament

NPT and IAEA safeguards

- The NPT establishes a safeguards system under the responsibility of the IAEA
- When NPT entered into force the IAEA began to implement safeguards measures in line with Article III of the treaty

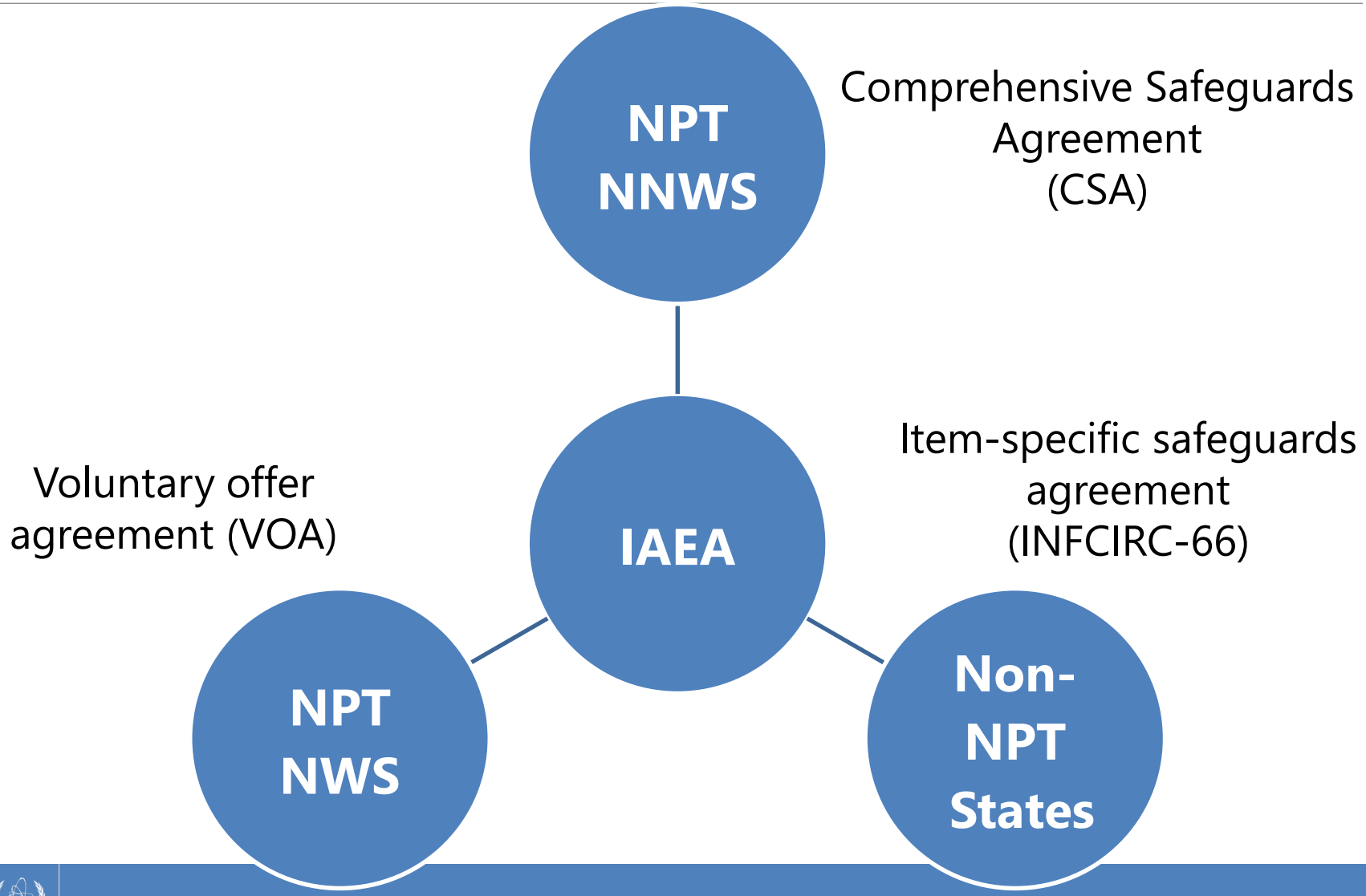
IAEA: Purpose of safeguards

- To seek to accelerate and enlarge the contribution of nuclear energy to peace, health and prosperity; and ensure that assistance is not used in a way that furthers any military purpose
- The IAEA pursues the non-proliferation element of its work through the implementation of a set of technical measures, or “safeguards”

IAEA: Purpose of safeguards

- Safeguards serve as important confidence building measures
- Help to ensure that nuclear material and technology and used only for peaceful purposes
- Aim to prevent diversion and misuse
- Without safeguards, there would be far less nuclear cooperation and transfer of technology

Types of Safeguards Agreement



‘Traditional’ Safeguards (pre-1991)

- Focused on declared facilities and verifying correctness of State declarations
- Limited detection possibilities of undeclared activities elsewhere in State
- Lack of complete State picture necessary to verify completeness of State declarations

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Responding to events 1991-95

- Nuclear weapon related activities in **Iraq** and **DPRK** demonstrated inadequacies of safeguards implementation
- Need for strengthening measures under existing legal authority
- But also need for additional authority to address possible undeclared nuclear material and activities

Responding to events post-2000

- **Iran** – 2002 revelations of undeclared activities; 2006 referral to UN Security Council
- **Libya** – use of A. Q. Khan network and subsequent disarmament 2003
- **ROK** (2004) and **Egypt** (2005) issues regarding accurate declarations
- **Syria** – assessment (2011) that building destroyed by Israel in 2007 was reactor that should have been declared to IAEA

Strengthening IAEA Safeguards

- Considering the State as a whole (overall picture)
- Increased access to information
- Increased access to locations (including beyond nuclear facilities)
- Use of advanced technology (e.g. environmental sampling, remote monitoring, satellite imagery)
- Enhanced transparency from, and cooperation with, States

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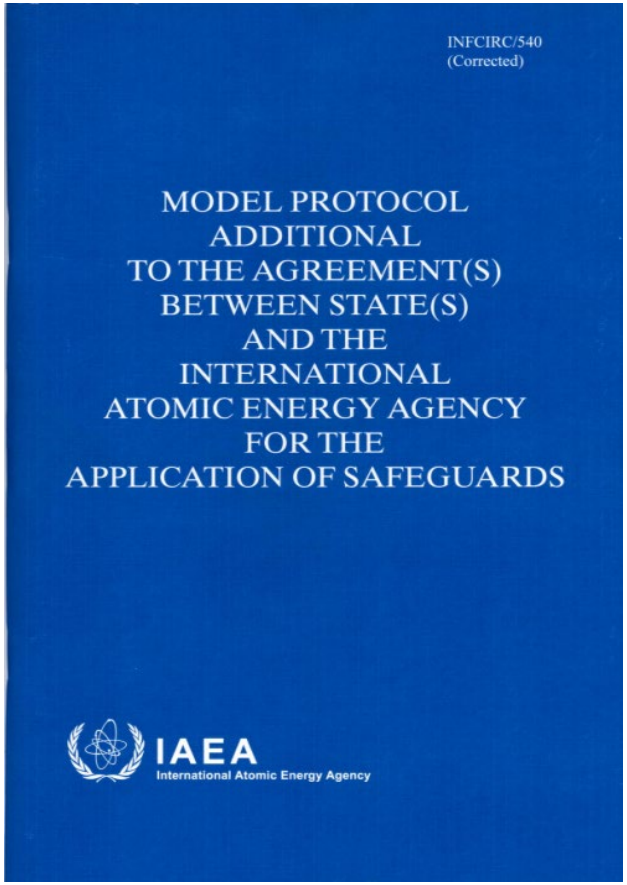
Safeguards legal framework

Comprehensive Safeguards Agreements

- State accepts safeguards on all nuclear material in all peaceful activities within its territory, jurisdiction or control
- IAEA is required to maintain confidentiality
- State to provide information concerning nuclear material and facilities
- State to provide access to the IAEA for inspections and design information verification

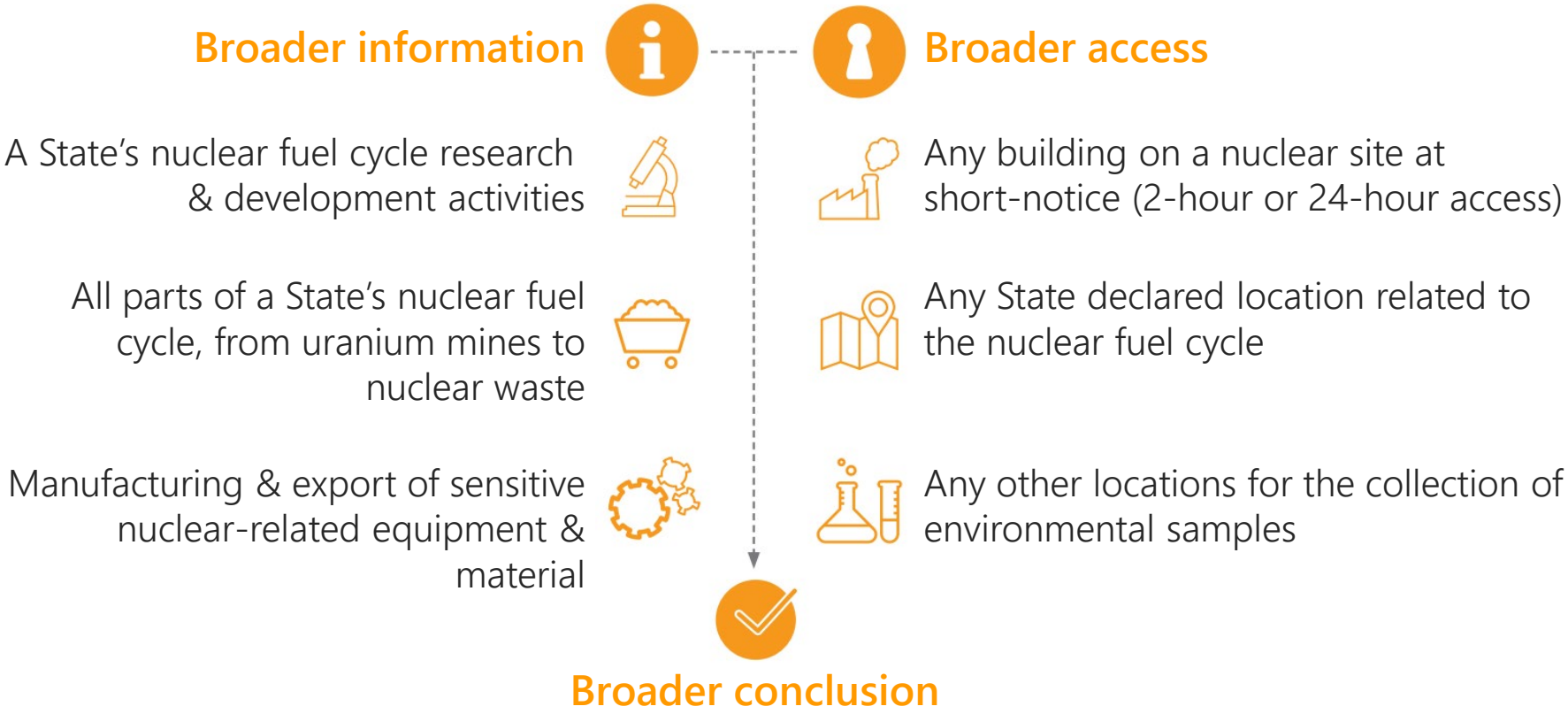
Additional Protocol (AP)



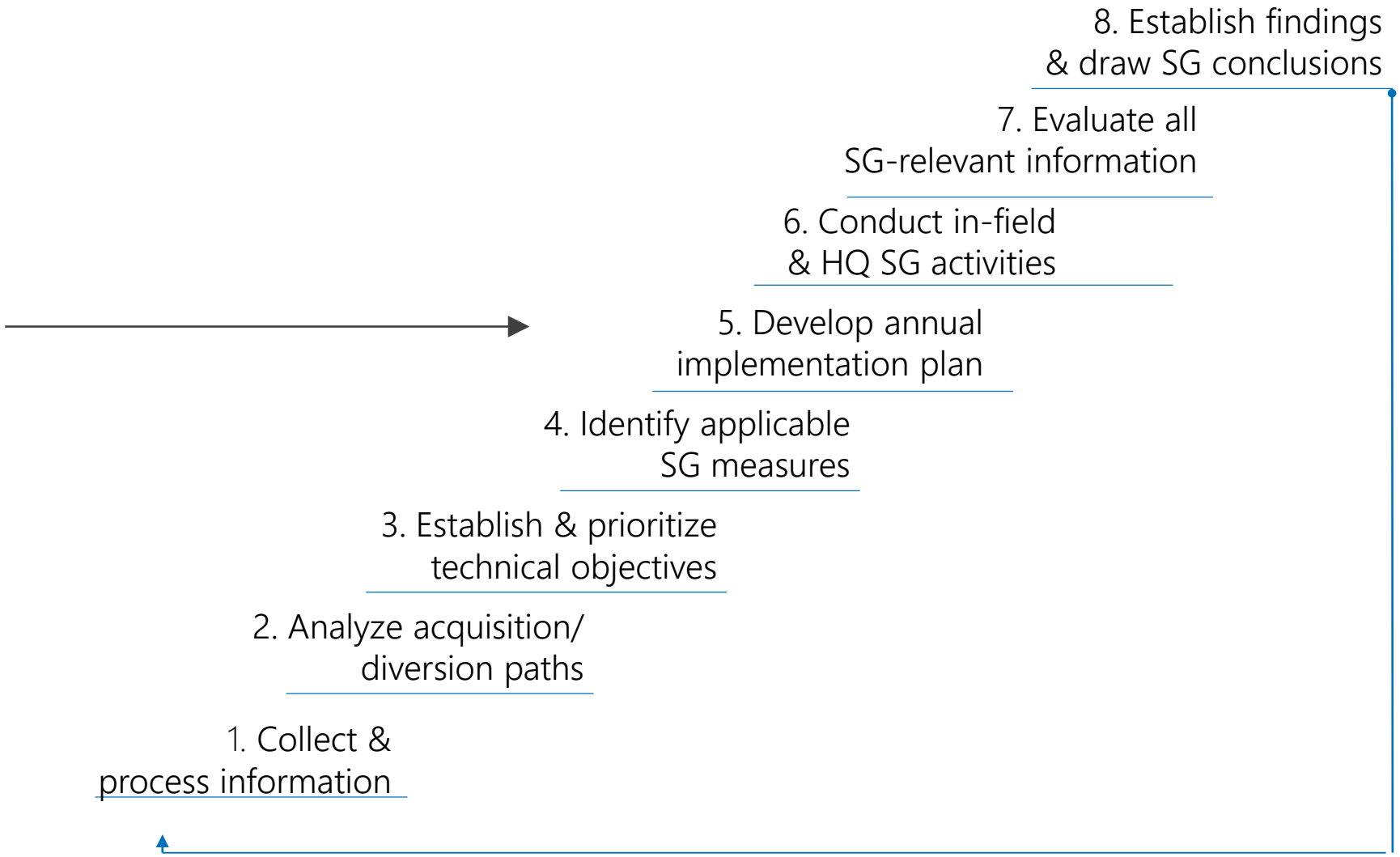
- New legal instrument approved by Board of Governors in May 1997
- Provides Agency with more rights of access to information and to locations
- Unlike CSA, signing AP is voluntary

Safeguards legal framework

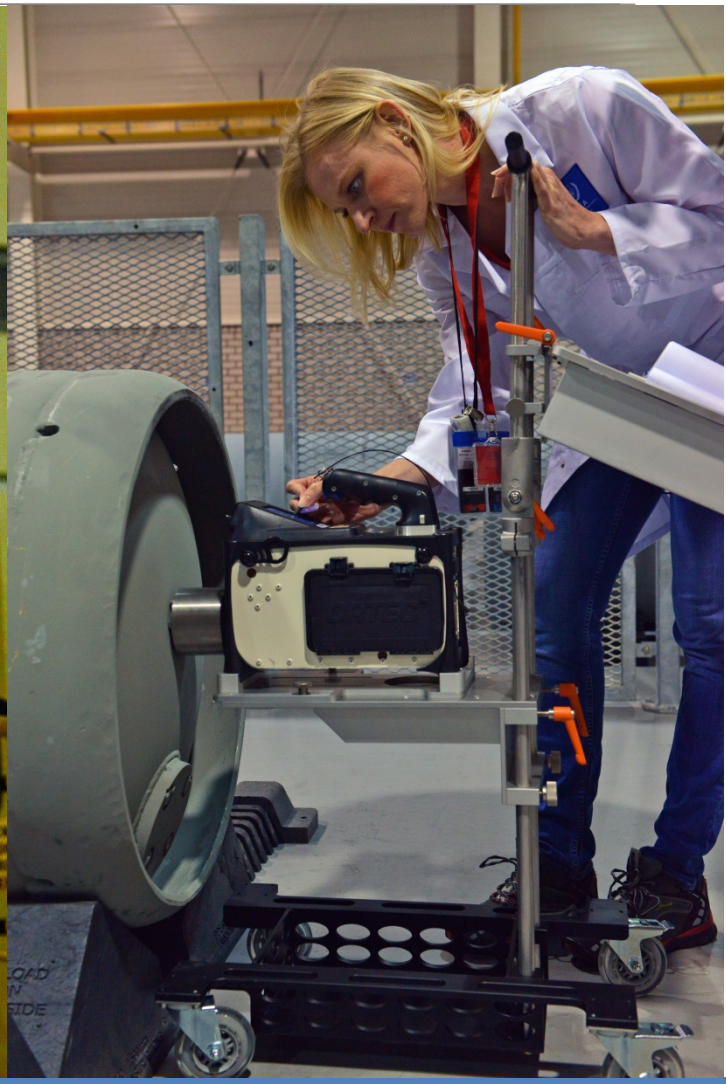
The Additional Protocol supplements a State's Safeguards agreement



Established Safeguards implementation processes

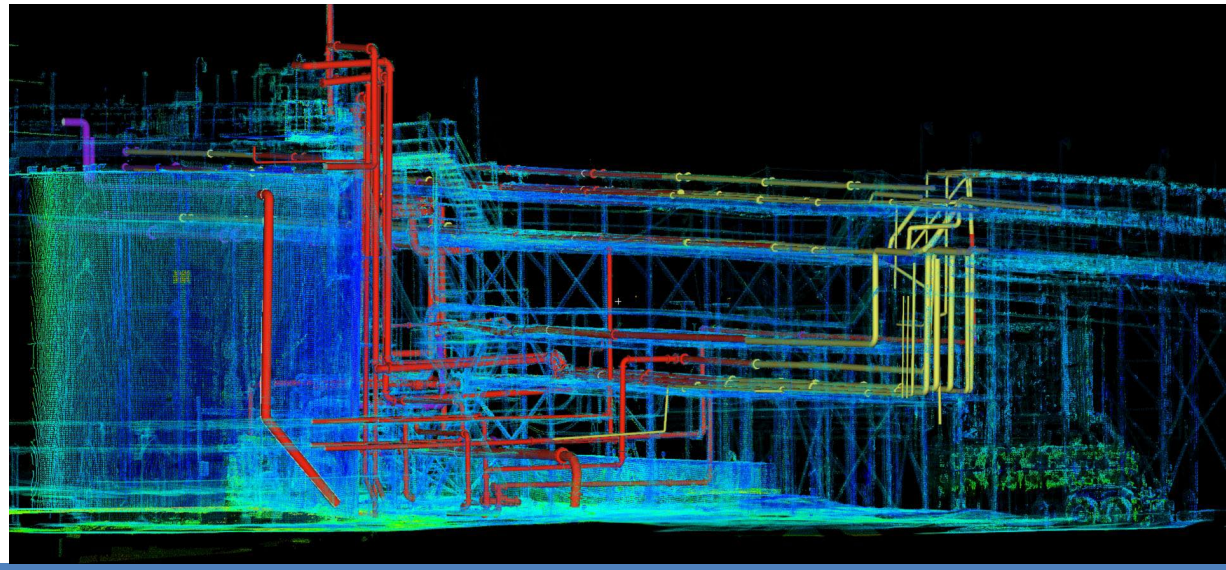


Core activity: inspections in the field



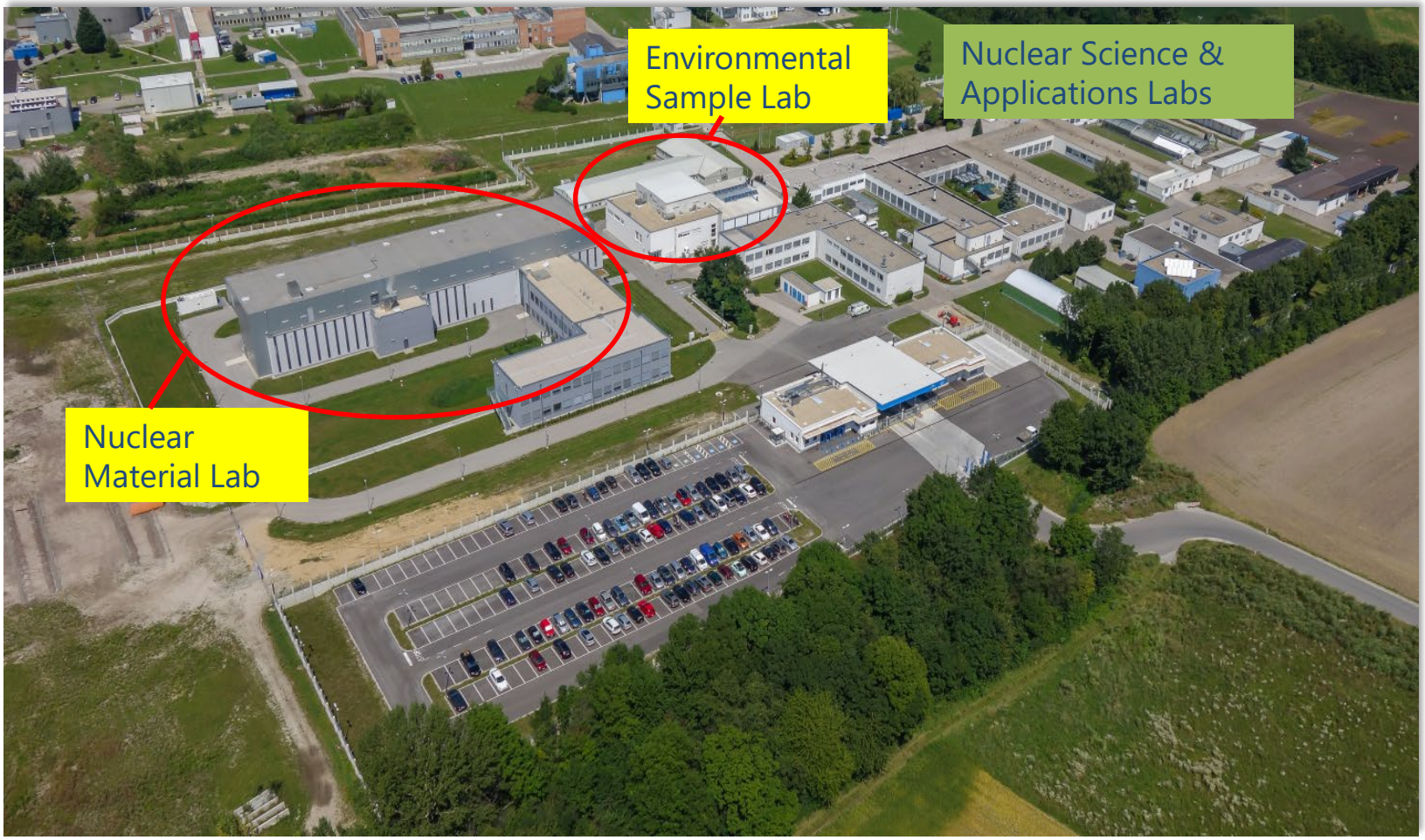
Safeguards surveillance systems

Safeguards verification technology



Safeguards sampling analysis

Safeguards Analytical Laboratories

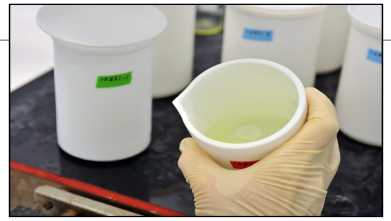


Nuclear Sample Analysis at NML

Sample Receipt

Sample Weighing (U)

Sample Dissolution (U)



Isotopic Aliquot (U)

Assay Measurement U)

Assay Measurement (Pu)

Isotopic Measurement

Impurity Measurement

Environmental Sample Analysis at ESL

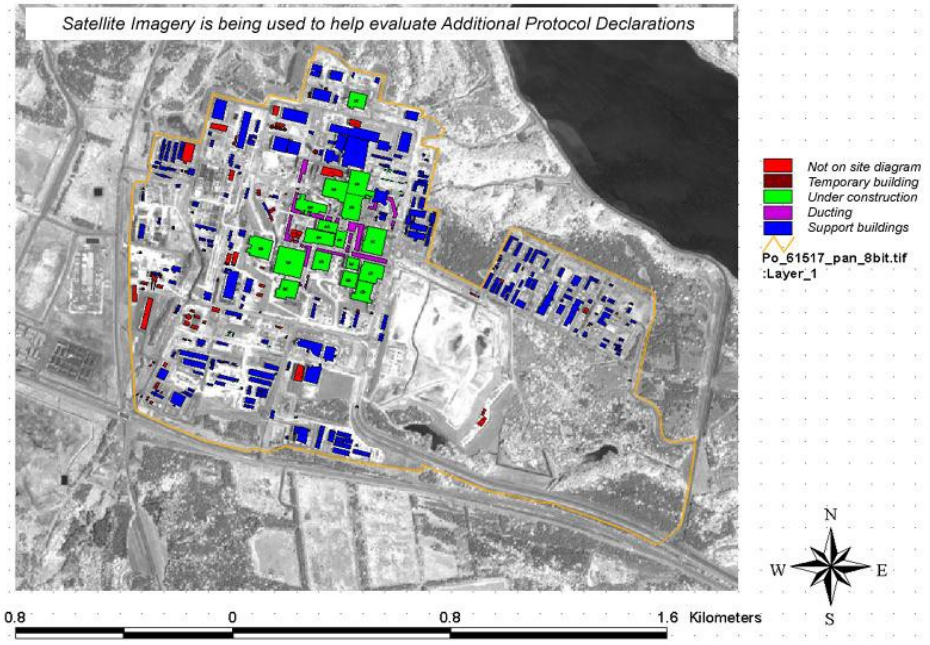
Sample preparation

ICP-MS

LG SIMS

SEM

Safeguards satellite imagery analysis



Open source data collection & analysis

Collaborative Analysis Platform

Safeguards operations at a glance (2017)

safeguards implemented in **181 States** of which **132 States** have additional protocols in force

nuclear material under safeguards that could be used to produce

208,889

nuclear explosive devices

1,298

nuclear facilities & locations outside facilities under safeguards

2,843

in-field verifications involving 13,275 days

24,300

seals verified

1,082

samples collected

1,541

cameras installed

Safeguards environment is changing fast

1. Increase in demand

2010 – 2017

+21%

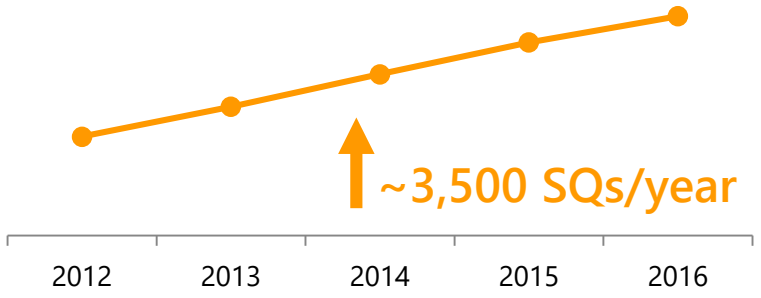
Nuclear material under safeguards

+10%

Nuclear facilities & locations outside facilities under safeguards

2. Increasing spent fuel transfers & decommissioning

Irradiated plutonium under safeguards

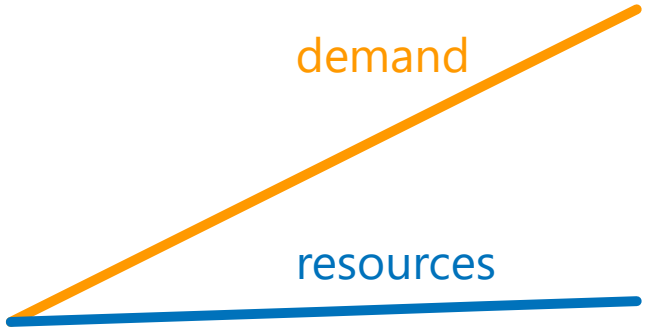


Safeguards environment is changing fast

3. Accelerating changes in technology, global connectivity (globalization) and increasing volume & complexity of information

e.g. additive manufacturing, big data

4. Growing gap between demand & resources



Safeguards priorities

Detecting the diversion of nuclear material from peaceful purposes

Detecting the misuse of nuclear material and technology

Detecting undeclared nuclear material and activities

Verifying Iran's nuclear-related commitments

Consolidating the State-Level Approach processes and procedures

Improving of the State evaluation process and reporting

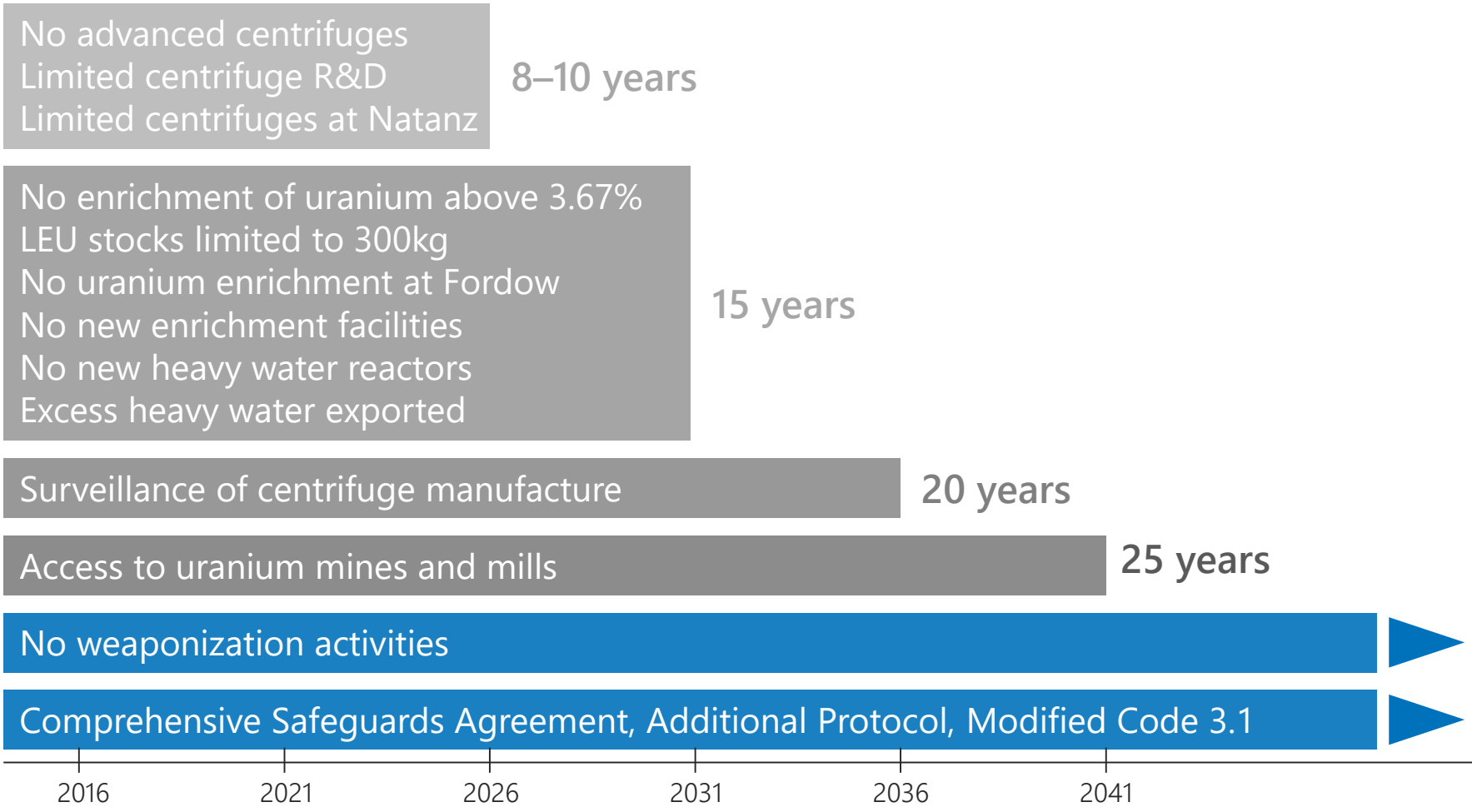
Promoting operational and analytical collaboration

Maintaining readiness to resume verification in the DPRK

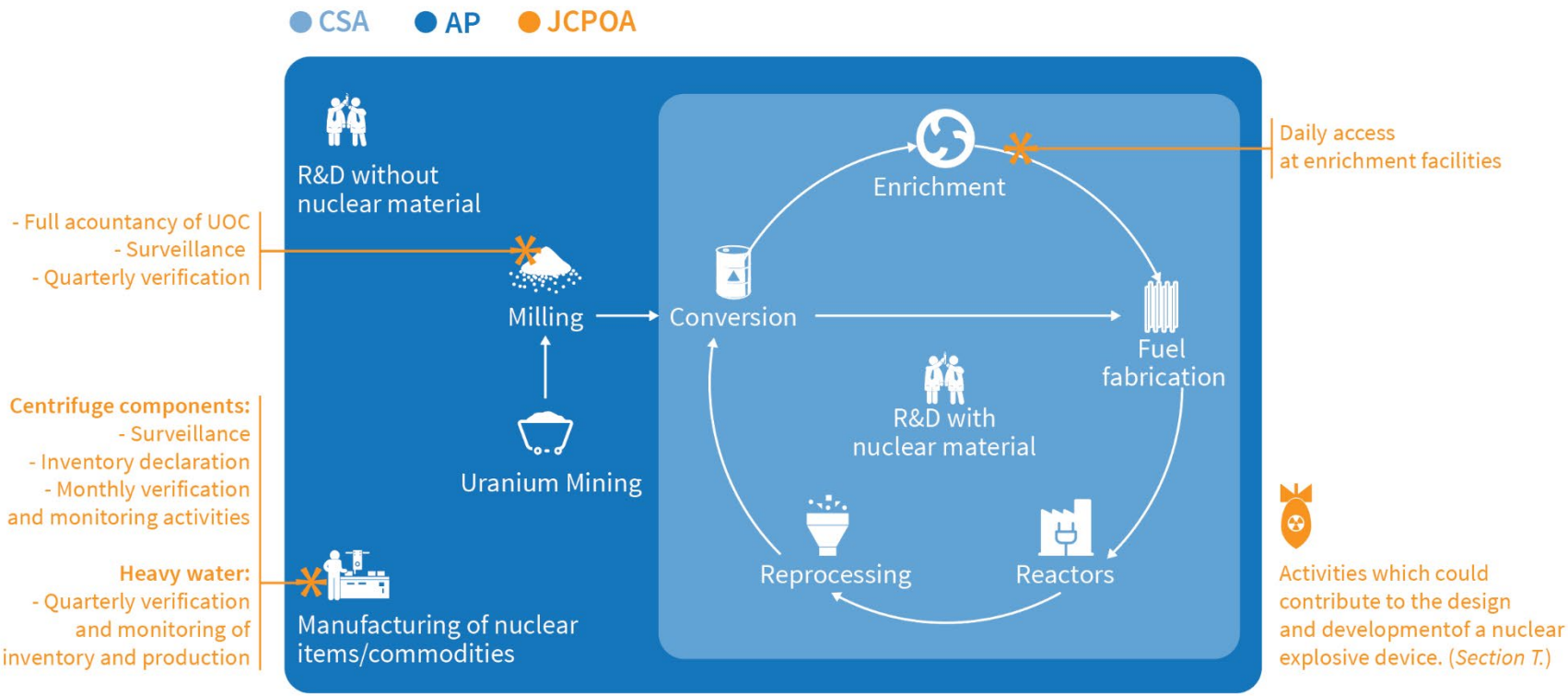
Providing credible safeguards conclusions via an enhanced Safeguards Implementation Report

Case Study: Iran and JCPOA

In line with standard safeguards practices



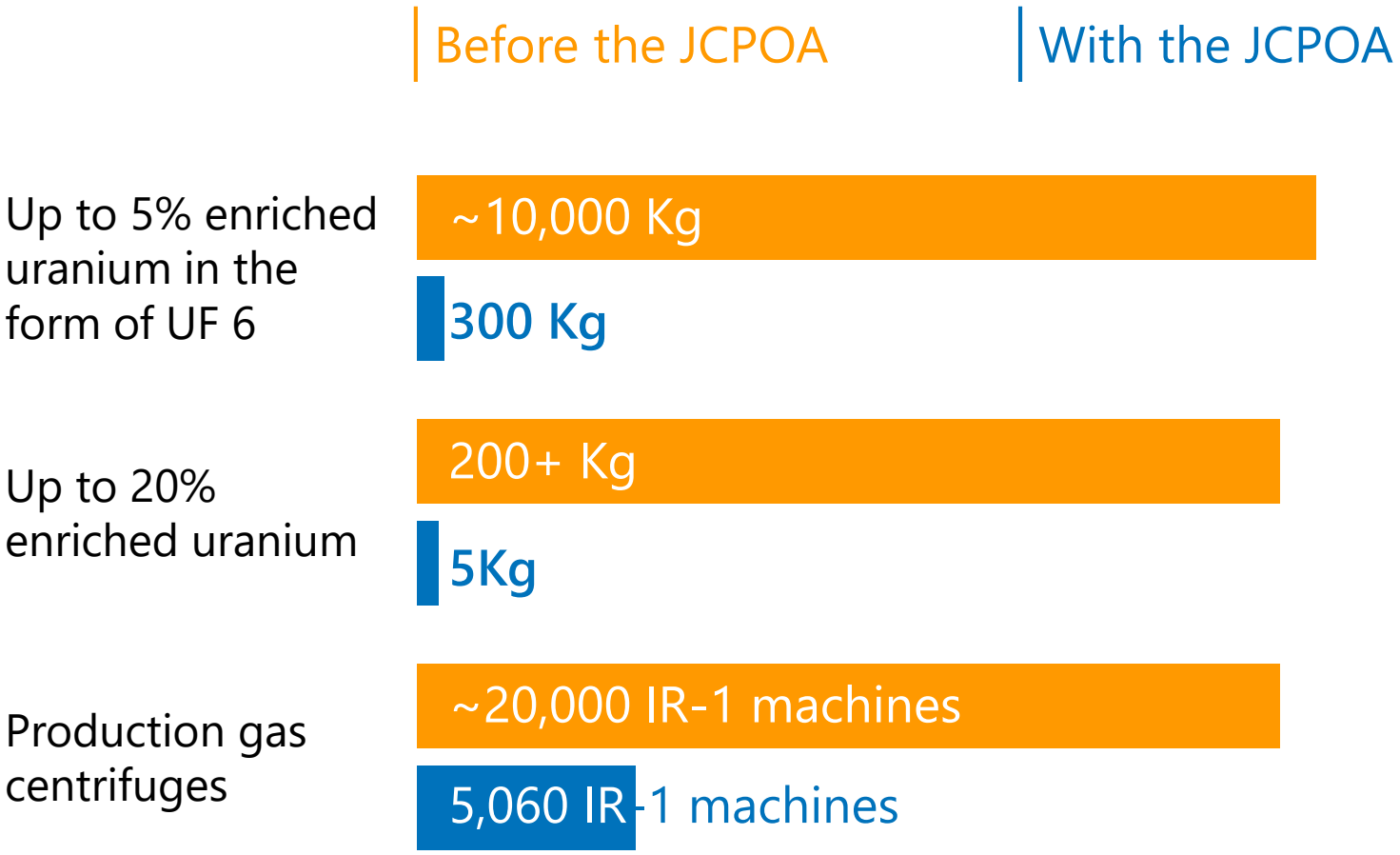
The IAEA now has wider access to, and more information on, Iran's nuclear programme



JCPOA is a gain for Safeguards

- Verification and Monitoring of:
  - ✓ UOC production and inventory
  - ✓ Heavy water production and inventory
  - ✓ Sensitive centrifuge component manufacturing
  - ✓ Enrichment R&D activities
- Provisional Implementation of the AP
  - ✓ Enables IAEA to conduct Complementary Access
  - ✓ More detail in Iran's 2.a.(x) declaration
- Reduced scope and scale of Iran's nuclear programme:
  - ✓ Enables IAEA to focus on remaining activities

JCPOA effects on safeguards



JCPOA Challenges

Some of the challenges we met with the JPA and JCPOA:

Verifying UF6 enrichment levels in real time inside Iran required a new tool: the on-line enrichment monitor.

Centrifuge R&D & manufacturing, remote monitoring, etc.: innovative and robust solutions were needed.

Measuring the production & inventory of heavy water rarely been done previously by the Agency.

Putting together a realistic budget & HR estimate; start implementing before sufficient funding secured

Case Study - DPRK

Yongbyon

- IRT Research Reactor
- Critical Facility
- Fuel Rod Fabrication Plant
- 5 MW(e) NPP
- Radiochemical Laboratory
- Fresh Fuel Rod Storage
- 50 MW(e) NPP
- Reported Enrichment Plant
- Reported LWR

Taechon

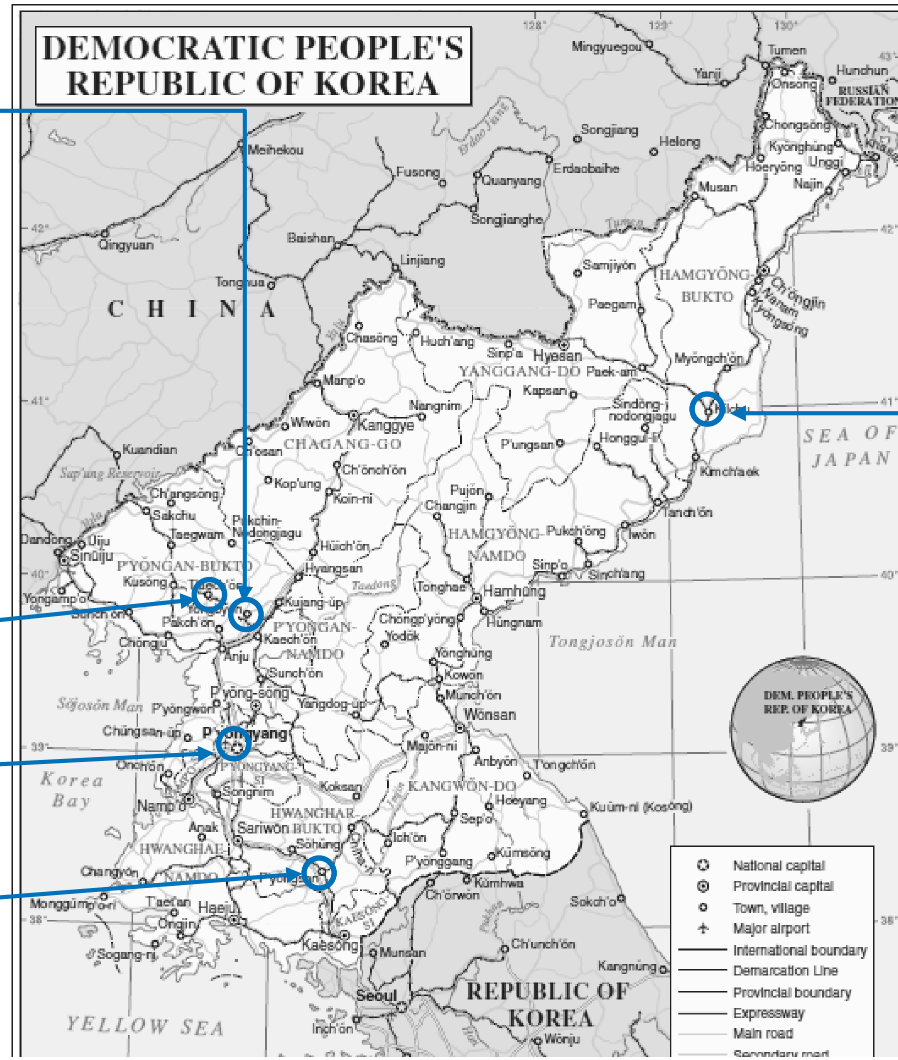
- 200 MW(e) NPP

Pyongyang

- Sub-Critical Assembly

Pyongsan

- Uranium Mine and Concentration Plant



Kilchu

- Nuclear Test Site

DPRK readiness

Safeguards Portal | Sites

BROWSE PAGE

Safeguards Portal | Committees | Divisions | Processes | Services

- Documents
  - Shared Documents
  - Preparedness Documents
- Pictures
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- Lists
  - Announcements
  - Links
  - Calendar
  - Tasks
- Discussions
  - Team Discussion
- users
- Integrated Data Planning Project (IDP)
- Recent

Divisions > SGOA > OA3 > DPRK Preparedness

DPRK - Preparedness for the return

Title	Assigned To
Establishing Teams	
Procedures	
Budget Planning	
Equipment List Update	
Equipment Procurement	
Shipment of Equipment and Consumables	
1st Team Arrangements	
Medium Term Planning Implementation	
Short Term Planning Implementation	

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Looking ahead

To strengthen our ability to detect early indications of safeguards concern, in particular detection of undeclared nuclear activities and materials.

Looking ahead

To advance safeguards implementation at the State level.

We will continue our efforts to update our internal guidance documents and reference materials on State level safeguards implementation.

Looking ahead

To be ready to carry out other emerging verification tasks

e.g. monitor & evaluate the status of DPRK's nuclear activities & maintain readiness to resume safeguards activities.

SAFEGUARDS

The nuclear world continues to change.

We must adapt, increase our productivity, and strengthen our partnerships so we can

successfully meet the challenges of tomorrow

Q&A