



IAEA

60 Years

Atoms for Peace and Development



Trilateral Initiative



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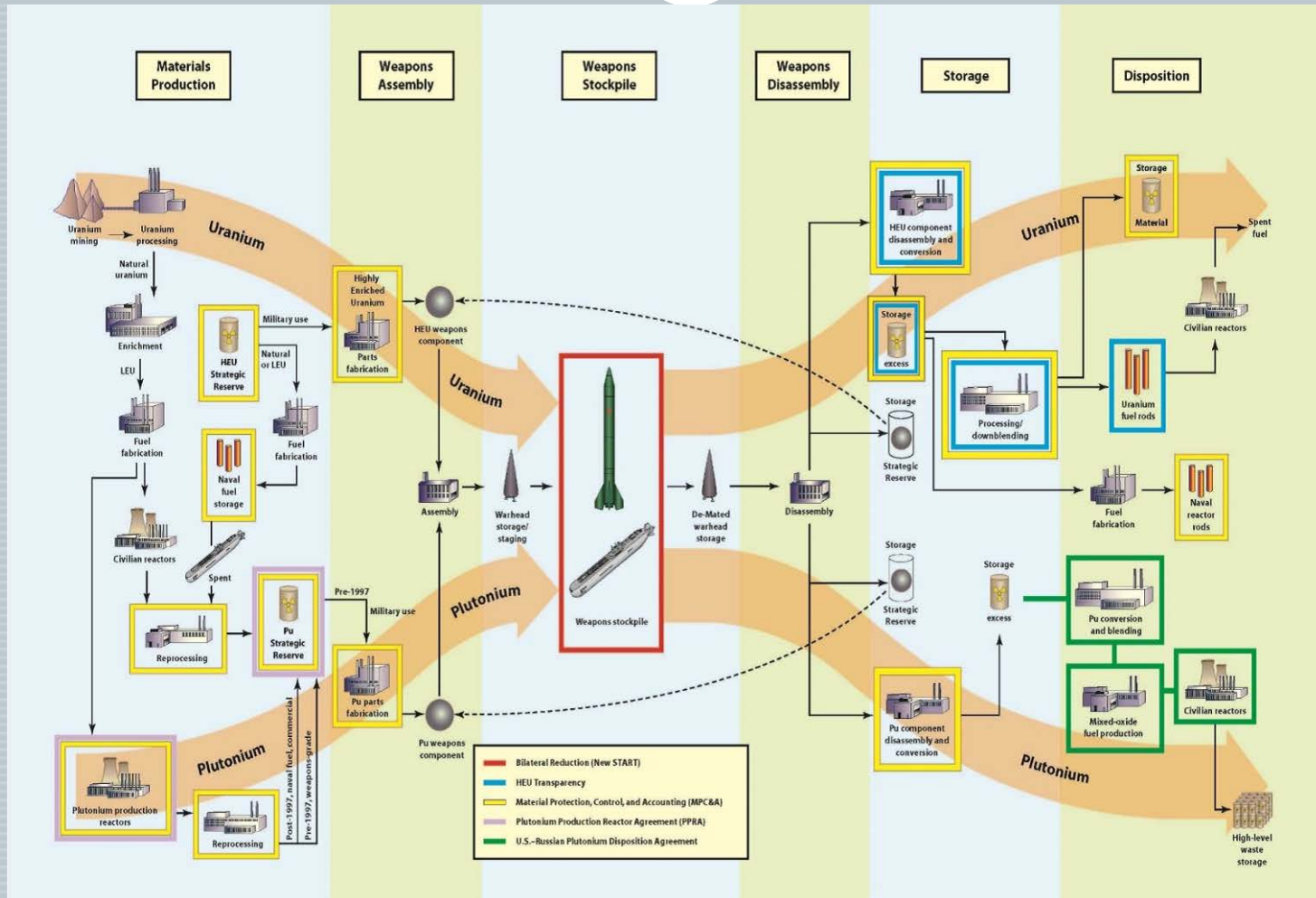


Requirements



- **Credible independent verification and irreversible undertaking**
 - to build confidence and trust among the parties, and encourage mutual restraint
- **No proliferation of sensitive information disclosed**
 - to comply with Article 1 of the NPT: Each nuclear-weapon State Party to the Treaty undertakes not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly; and not in any way to assist, encourage, or induce any non-nuclear-weapon State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices.

Nuclear Weapons Lifecycle



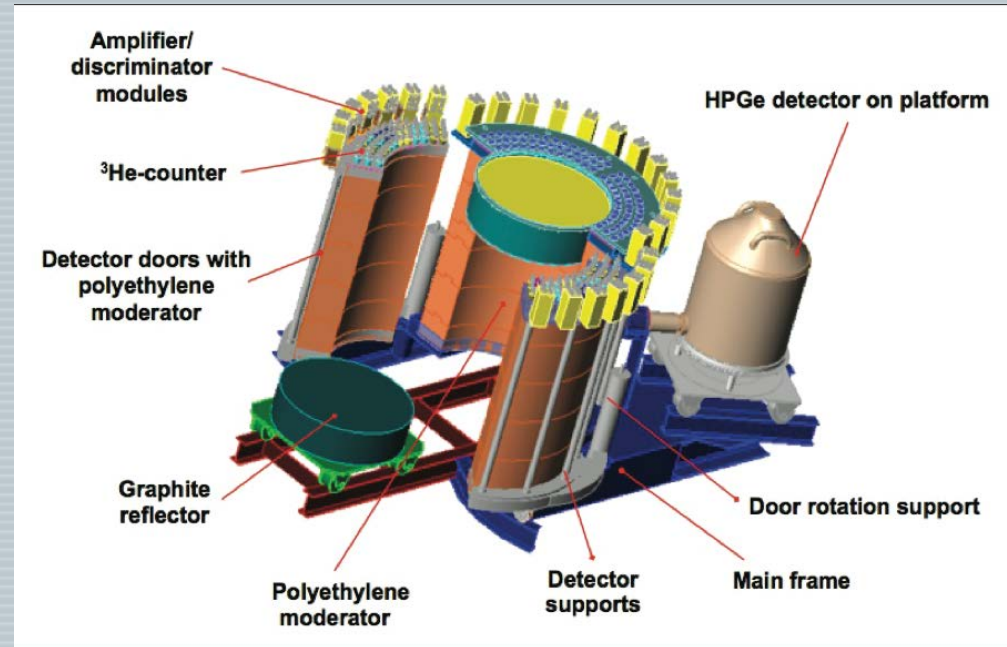
What Was the Trilateral Initiative?



- **Six-year effort (1996-2002) between the Russian Federation, the United States and the IAEA to develop technical and legal framework for IAEA verification of classified forms of weapon-origin fissile material;**
- **Framework and verification methods were designed to protect classified information and ensure NPT obligations under Article I were met.**

Attribute Verification by Neutron and Gamma Ray Assay Using Information Barriers (AVNG)

- 1. *Attribute test 1:*** Confirm the presence of plutonium using high-resolution gamma ray spectroscopy;
- 2. *Attribute test 2:*** Confirm that weapons grade plutonium is by measuring amounts of Pu-239 and Pu-240 and their ratio;
- 3.** Measure Pu-240 mass by neutron multiplicity counting, and
- 4. *Attribute test 3:*** Establish mass of plutonium present using data from steps 2 and 3.



AVNG Prototype

After the Trilateral initiative Russian and American scientists built a prototype AVGN.

See: S. Razinkov, A. Livke, S. Kondratov, J. Thron, M. Bulatov, M. Leplyavkina, D. Sivachev, S. Tsybryaev, A. Vyushin, D.W. MacArthur, The Design and Implementation of the AVGN, Proceedings of the 51st Annual Meeting of the Institute of Nuclear Material Management, Baltimore, MD, July 2010.



The Prototype AVNG System

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Tomorrow's Tools for Tomorrow's Challenges



- **Agree on the starting point of the verification:**
 - include current fissile material stocks and historical production of fissile material?;
 - define goal quantities, timelines, and confidence levels of verification (they could all be different from the current IAEA standards for direct use materials).
- **Craft a credible verification system:**
 - procedures for on-site inspections;
 - provisions for access to sensitive facilities and items subject to inspection;
 - requirements for declarations on material and design of facilities.
- **Develop new less intrusive and precise methods and take the advantage of new emerging technologies**