Designing nuclear disarmament
The verification and compliance challenges

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Outline

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Definitions

- Monitoring: the gathering of data
- Verification: the matching of data to treaty obligations (and beyond)
- Compliance: dealing with alleged non-compliance
- Confidence-building: deliberate confidence-building measures (CBMs) or a result of the effectiveness of verification and compliance system

Goals of verification and compliance arrangements

- **detection**: effective detection of non-compliance, timely enough to mount an effective response
- **deterrence**: combination of high probability of detection and effective response
- **confidence-building**: combination of voluntary and mandatory measures and the system's track record

How much verification is enough?

- 100% verification impossible
- trade-offs always involved in designing verification systems: political; technical; financial (see Allan Krass, *Verification: How Much is Enough?*)
- instead verification needs to reduce the risk of non-compliance to a minimum by:
  - providing a high (but unquantifiable) probability of timely detection
  - raising the cost of attempting to cheat (political, technical, financial)
  - creating uncertainty in the minds of the potential violator: 'the verification uncertainty principle' (apologies to Heisenberg)

How much verification for a nuclear weapon-free world?

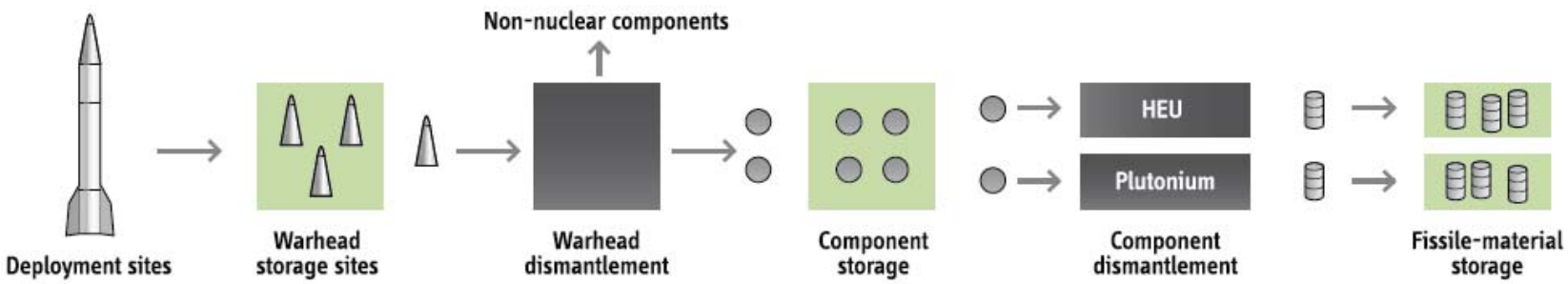
- unprecedented transparency required: in order to build and sustain confidence
- unprecedented intrusiveness of monitoring and inspection: due to the international security implications of 'breakout'
- overlap and redundancy of monitoring
- a more dependable compliance system than currently exists via the UN Security Council

Verification tasks and methods – the (relatively) easy part

- Dismantlement and destruction of **declared** nuclear weapons, facilities and delivery systems
  - ✓ *build on START I/INF/New START*
  - ✓ *research by US, UK, Russia has produced common understanding of challenges and potential solutions*
  - ✓ *additional research needed on warhead dismantlement*

- Verification of non-diversion of **declared** fissionable materials/facilities to new weapons production
  - ✓ *improved IAEA safeguards, especially for timely detection at bulk handling facilities (enrichment/reprocessing)*

Verification points in nuclear disarmament



Source: *Global Fissile Material Report 2009*, International Panel on Fissile Materials, 2009, p. 68.

Verification tasks and methods– the hard part

- verification that no undeclared weapons, materials or facilities remain
  - ✓ *intrusive challenge inspections*
  - ✓ *new technical means of remote/wide area detection needed*

- timely detection of resumed or new research, development or manufacture of nuclear weapons
  - ✓ *intrusive routine and challenge inspections and constant monitoring*

Verification tools

- transparency and confidence-building measures: declarations; self-reporting; nuclear accountancy/archaeology/forensics
- remote monitoring: satellites and aircraft (Open Skies); atmospheric; seismic; environmental
- unattended on-site, portal or area monitoring; cameras; detectors
- on-site inspections: permanent, routine, unannounced, challenge
- National Implementation Measures
- ‘whistleblowers’

Institutions

- Agency for the Prohibition of Nuclear Weapons (successor to the IAEA?)
  - universal membership
  - Executive Council to handle non-compliance cases
  - Secretariat and inspectorate, analytical specialists, weapons experts
  - global verification, monitoring and communication systems
- Reformed United Nations Security Council or separate NWC Compliance Commission?
  - more representative membership
  - no veto

Additional arrangements

- ‘National Technical Means’ (HUMINT, SIGINT, ELINT)
- verification/compliance arrangements between former weapon states (US/Russia/China; India/Pakistan; the 2 Koreas; Israel and its neighbours)
- regional approaches: enhanced Nuclear Weapon-Free Zones
- Continuing strengthening of measures against nuclear terrorism: i.e. nuclear security regime
- civil society monitoring (equivalent to Landmine Monitor)

The ‘break-out’ problem

Impact would depend on circumstances:

- warning in time to take action
- whether the violator uses or threatens use and for what purpose
- readiness and deliverability of the weapon(s)
- existence of missile defences
- virtual nuclear deterrence (see Jonathan Schell’s works)
- conventional military strength of the violator vs. the rest of the international community
- international community’s determination to respond

Attenuating the 'breakout' problem

- ban reprocessing of plutonium
- ban use of HEU for any purpose
- multilateralize uranium enrichment (and even mining and processing?)
- intrusive on-site inspections or perimeter inspections long before final destruction of weapons to deter hiding of existing weapons
- an aggressive lessons-learned process as nuclear disarmament proceeds

What is there to do now?

- nuclear transparency/accounting/claw-back
- confidence-building measures between nuclear weapon states, including joint studies
- drawing lessons from existing global verification regimes (nuclear nonproliferation, nuclear testing, chemical weapons)
- fleshing out Model Nuclear Weapons Convention, including adding Verification Annex
- verification research and development – over to you!