

# CBRN Weapons

## Security Challenges and Their Control

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*The Trench*

*Trade Controls for GUAM Countries*

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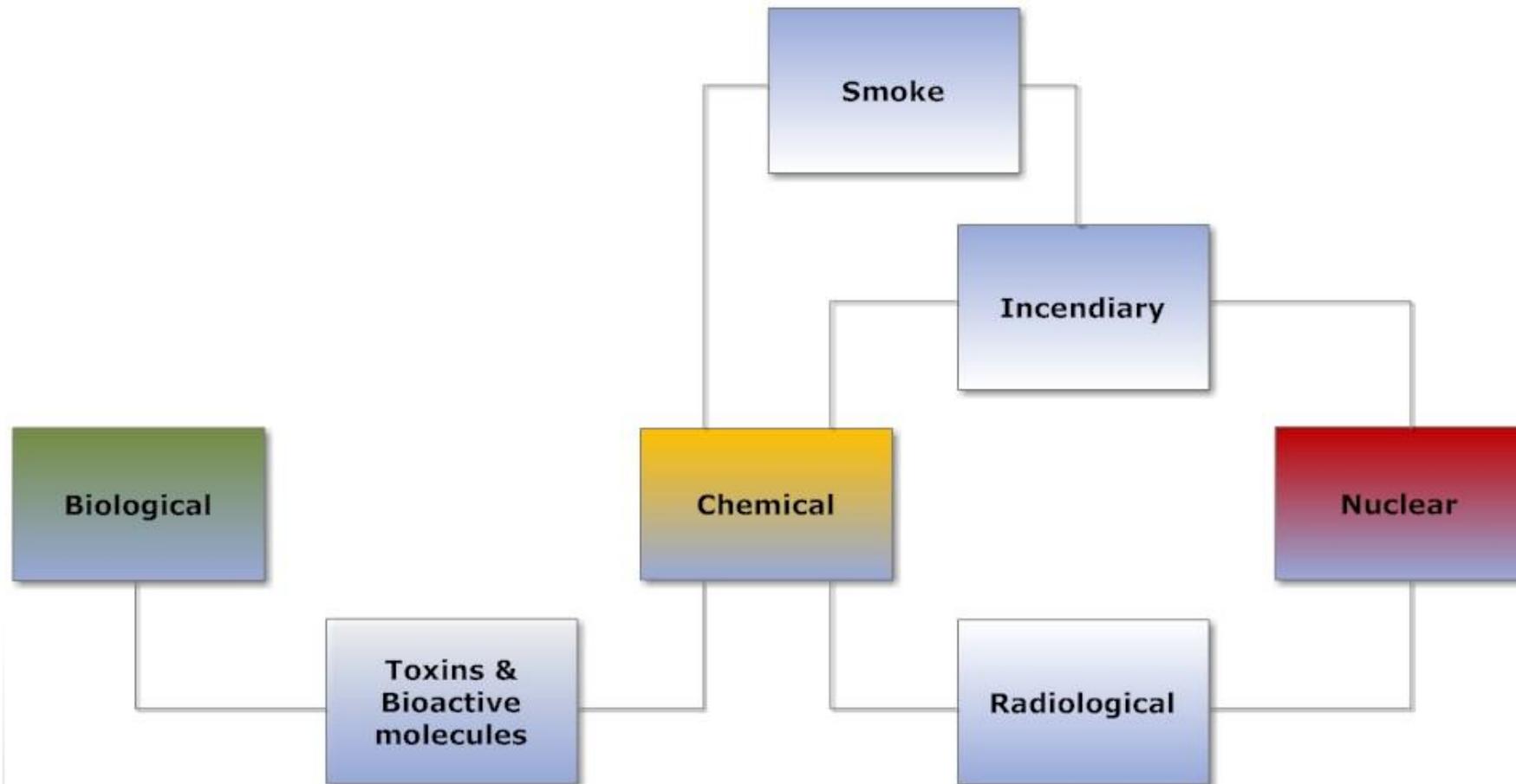
Part 1

# WHAT IS '*CBRN*'?

# An acronym never to forget

- CBRN: a collective term for 4 distinct weapon categories
  - **C**hemical weapons
  - **B**iological weapons
  - **R**adiological weapons
  - **N**uclear weapons
- Nevertheless, the boundaries between the weapon categories are fuzzy
  - Certain weapon types share characteristics with two of more main weapon categories, e.g.
    - Toxins, radiological weapons, smoke, incendiary weapons
  - Weapon evolution and history of military organisation have had an impact on the delineation of categories, e.g.
    - Why are CBW often uttered in the same breath?
    - Why do many people view smoke and incendiary weapons as CW?
    - Why are toxins covered by two major disarmament treaties?
    - Why are RW viewed as a main category?

# The CBRN spectrum



# Understanding the spectrum – 1

- **Chemical weapons**
  - Ranges from irritants (e.g. lachrymatory agent) and incapacitants (e.g. BZ & fentanyl) to the most toxic nerve agents (e.g. sarin & VX) or toxins (e.g. ricin & saxitoxin)
  - Core aspects of the CW definition in *Chemical Weapons Convention*:
    - Any toxic chemical which through its chemical action on life processes can cause death, temporary incapacitation or permanent harm to humans or animals (Plants not mentioned!)
    - Also covers precursors to such toxic chemicals
    - Delivery systems and specialised equipment
  - CWC definition is based on the *General Purpose Criterion*
    - Covers past, present *and* future toxic substances
    - Does not distinguish methods of synthesis or whether an agent may be naturally occurring
- **Biological weapons**
  - Ranges from incapacitating agents (e.g. salmonella) to lethal ones (e.g. anthrax bacteria or smallpox virus) or toxins (= overlap with CWC)
  - Core aspects of the BW definition in *Biological and Toxin Weapons Convention*:
    - Microbial or other biological agents, or toxins (human, animal and plants)
    - Weapons, equipment or means of delivery
    - Understanding evolves through common understandings reached at 5-yearly Review Conferences (e.g. inclusion of subcellular particles and bioactive molecules)
  - BTWC definition is based on the *General Purpose Criterion*
    - Does not distinguish between origin or method of production
    - Covers any relevant development in synthetic biology, genetic engineering, etc.

# Understanding the spectrum – 2

- **Radiological weapons**
  - Ranges from radioactive offal from hospitals or radiological centres to materials from the core of nuclear reactors
  - No formal international legal definition; there may be definitions of radioactive materials in national (criminal, environmental, health, etc.) law
    - With a few exceptions, RW were never really considered as a military tool
    - Impact of terrorist action with RW is seen as limited, even though one cannot ignore psychological or economic consequences
    - Decontamination would be complex and potentially costly (also in view of public concerns)
- **Nuclear weapons**
  - Ranges from portable nuclear demolition charges to the 50Mt Vanya hydrogen bomb (Tsar Bomba)
  - No universally accepted legal definition
    - Some definitions are included in regional *Nuclear Weapon-Free Zones* (but phrasing may differ)
      - Southeast Asia Nuclear Weapon-Free Zone Treaty and Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean define '*nuclear weapon*'
      - African Nuclear Weapon Free Zone Treaty and South Pacific Nuclear Free Zone Treaty define '*nuclear explosive device*'
      - Central Asian Nuclear-Weapon-Free Zone defines '*nuclear weapon or other nuclear explosive device*'
    - Legality of NW possession essentially regulated via *Nuclear Non-Proliferation Treaty*
    - Equipment and materials regulated via Safeguards Agreements administered by the *International Atomic Energy Agency* (different treaty from NPT) to ensure their application to peaceful purposes
    - Nuclear Weapon States as defined under the NPT have a different legal status from Non-nuclear Weapon States

Part 2

WHAT ARE THE PRINCIPAL

*INTERNATIONAL CONTROL REGIMES?*

# Main prohibitions against CBW

- 1925 Geneva Protocol
  - Prohibits the use in war of CBW
  - Marginalised CBW in military doctrine → foundation for disarmament
- 1972 Biological and Toxin Weapons Convention (BTWC)
  - Comprehensive ban on development, production and possession of BW and toxin weapons
  - Ban on BW use in Geneva Protocol + Final Declaration of 4th Review Conference (1996)
- 1993 Chemical Weapons Convention (CWC)
  - Comprehensive ban on CW development, production, possession, and use
  - Also covers toxin weapons

# BTWC and CWC

- Definition of the weapon under consideration
  - Demarcates applicability of treaty
  - Lays foundation for the verification system
- All dimensions of the ban on development, acquisition and possession covered
  - Backward-looking dimension (destruction of weapons & related infrastructure)
  - Forward-looking dimension (prevention of future armament)
  - Application of the *General Purpose Criterion* in the definition
  - Prohibits use under any and all circumstances
  - Covers inter-state behaviour, as well as terrorism and crime
  - Demands national implementation, including national criminalisation and penalisation of international prohibitions
- Operates tools to enhance transparency, monitor and enforce compliance (incl. verification), and resolve concerns and conflicts

# General characteristics

- **Multilateral → inclusive treaties**
  - Any country can join if it so desires
  - Equal obligations and rights for all parties to the treaty
- **Other issue-specific tools will tend to draw on or reinforce the SITS**
  - UN Secretary-General's investigative mechanism
  - UNSC Resolution 1540 with regard to CBW
  - Australia Group control lists → from plurilateral tool to increasingly accepted standard for national legislation on CBW
  - Ability for adaptation to special circumstances
    - E.g., OPCW-UN Joint Mission for CW elimination in Syria
- **Ability to build functional lateral links to other treaty systems or international organisations**
  - BTWC → FOA, OIE, WHO
  - CWC / OPCW → UN, WHO
  - CWC – BTWC interaction on science and technology conversion

# Additional benefits

- Emerging issue areas become integrated into conventions
  - Biosecurity & -safety in BTWC + development of lateral functional links (WHO)
  - Chemical security & safety in CWC
    - Helps to build regional dynamics in support of the convention
    - Overcomes politically sensitive issue of prepositioning emergency assistance equipment in certain regions
    - Supports training, capacity-building and other aspects of international cooperation for peaceful purposes
  - Close monitoring of scientific & technological developments
- One negotiation; single ratification / accession process
- Other institutions will draw on the central prohibitions in SITS to develop own specific actions
  - E.g. Interpol, WCO, professional and academic associations, etc.
  - Widens and deepens multi-level stakeholdership → reinforcement of the core norm against CBW

# Scattered approach in NW control

- No formal prohibition on NW use
  - Nuclear Weapons Ban (2017) not yet in force
- Multiple additional initiatives, but no integration:
  - Bilateral treaties (e.g., SALT, INF, START, ...) between USA – USSR/Russia; Regional nuclear weapon-free zones
  - Plurilateral initiatives, often with informal status (technology transfer arrangements, Global Partnership, nuclear security summits, ...)
  - UNSC resolutions (1540, nuclear terrorism, ...)
  - Unilateral drawdown of nuclear forces, but with modernisation of remaining weapon holdings (mostly in terms of delivery systems)
- No definition of a NW
- Radioactive materials: under nuclear umbrella or not?

# Non-Proliferation Treaty (1968)

- **Principal provisions**

- Nuclear Weapon States (NWS) shall not transfer NW or NW-related technology to Non-Nuclear Weapon States (NNWS)
- NNWS commit themselves not to develop or otherwise acquire NW
- NNWS obtain the right to receive nuclear technology for peaceful purposes
- External organisation (IAEA) responsible for administering safeguards

- **Gaps from a weapon control perspective**

- No weapon elimination or limitation
  - Commitment to pursue good-faith negotiations towards disarmament
- There are 'nuclear-armed states' (i.e. not recognised NWS)
- No verification of NW programmes in NWS
- Discriminatory regime between NWS and NNWS

# Nuclear Weapons Ban (2017)

- **Principal provisions**
  - Prohibits threat of use and use in armed conflict
  - Complete elimination of NW stockpiles
  - Bans NW development, production, testing, acquisition, stockpiling, transfer and deployment of NW from another state on territory of a state party
  - Conflict resolution framework
  - National implementation requirements
  - Non-discriminatory
- **Gaps from a weapon control perspective**
  - Not yet in force (70 signatories; 23/50 required ratifications as of 1 May 2019)
  - No verification provisions (except for IAEA comprehensive safeguards obligation, including for non-diversion of nuclear materials following weapon destruction)
  - No international implementation organisation foreseen
  - No explicit transfer controls
  - Which are the incentives for NWS and nuclear-armed states to join treaty?
  - Not a SITS

# Nature of arms control and disarmament agreements

- **Global (multilateral)**

Partial Test Ban Treaty (PTBT, 1963), Outer Space Treaty (1967), Non-Proliferation Treaty (NPT, 1968), Seabed Treaty (1971), Biological and Toxin Weapons Convention (BTWC, 1972), Moon and Other Celestial Bodies Agreement (1979), Chemical Weapons Convention (CWC, 1993), \*Comprehensive Test Ban Treaty (CTBT, 1996), Mine Ban Convention (1997), \*Nuclear Weapons Ban (2017)

- **Regional (multilateral)**

Antarctic Treaty (1959), Conventional Armed Forces in Europe Treaty (CFE Treaty, 1990), Nuclear Weapon Free Zones: Tlatelolco (1967), Rarotonga (1985), Bangkok (1995), Pelindaba (1996), Semipalatinsk (2006)

- **Bilateral**

Anti-Ballistic Missile Treaty (ABM Treaty, 1972), Strategic Arms Limitation Treaty I (SALT I, 1972), \*Strategic Arms Limitation Treaty II (SALT II, 1979), Intermediate Range Nuclear Forces Treaty (INF Treaty, 1987), Strategic Arms Reduction Treaty I (START I, 1991), Strategic Arms Reduction Treaty II (START II, 1993), Strategic Offensive Reductions Treaty (SORT, 2002), New START (2010)

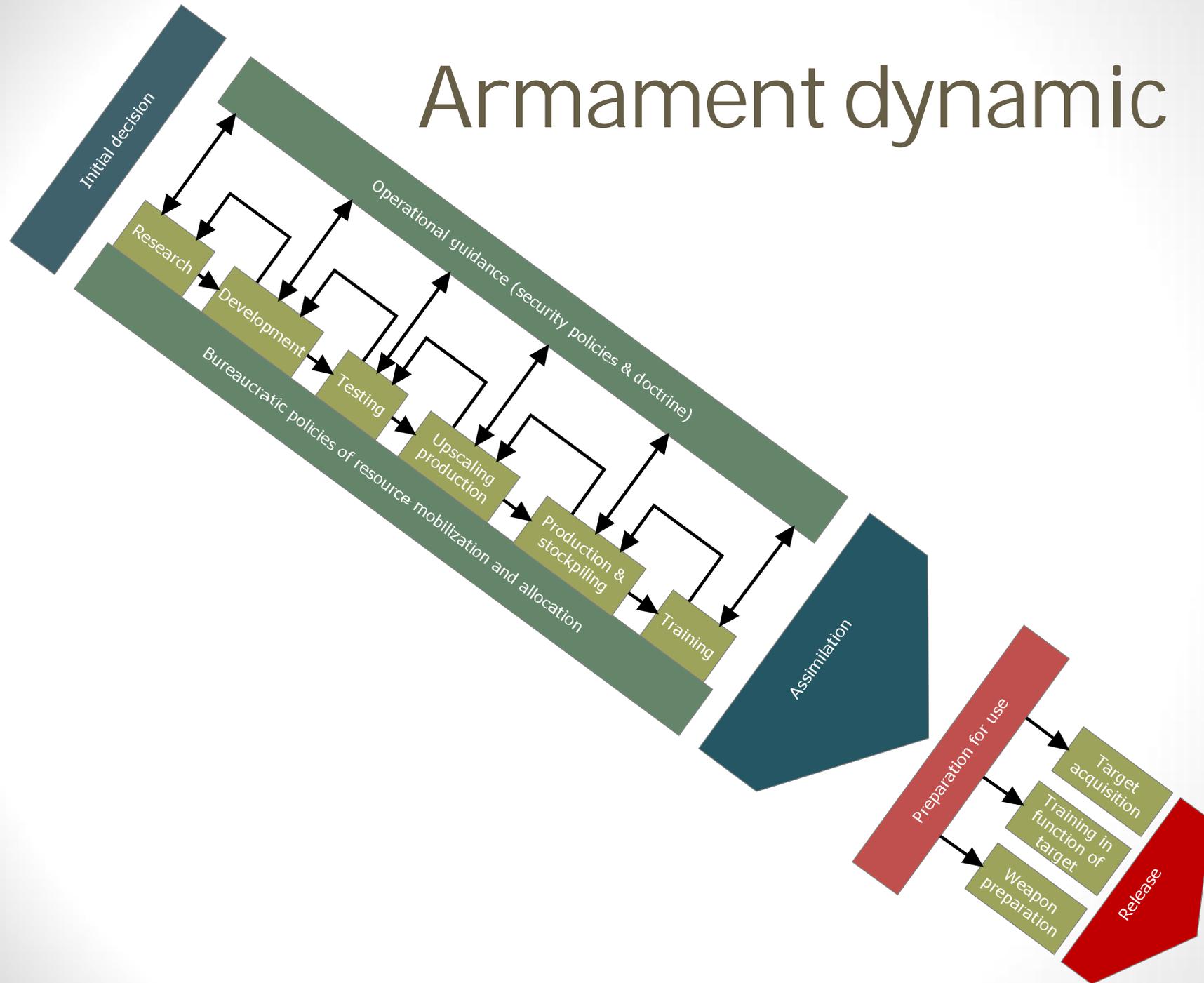
Part 3

*'ARMAMENT'* AND *'PROLIFERATION'*

# Armament versus proliferation

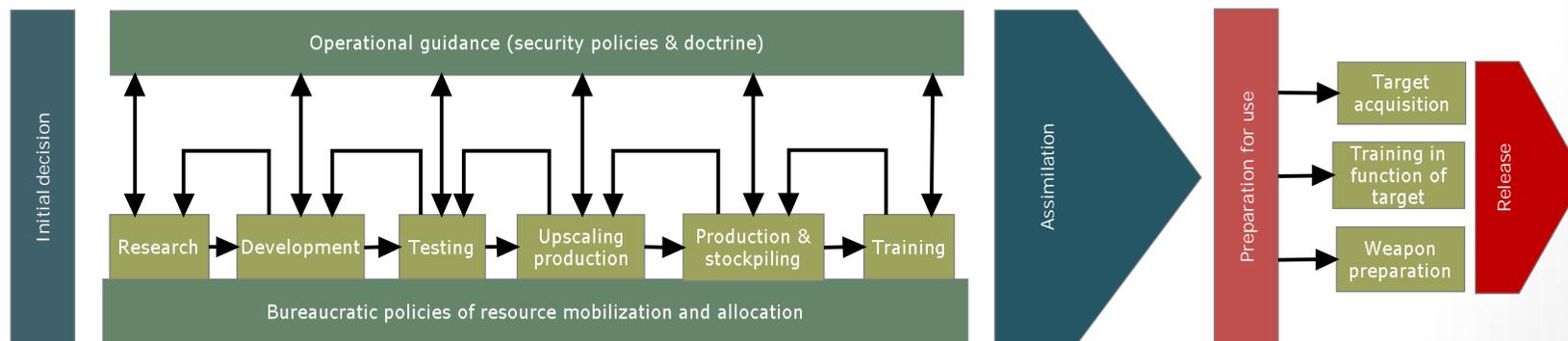
- **Armament:**
  - Quantitative or qualitative enhancement of military capacity
  - Essentially a domestic process
    - Internal process for criminal or terrorist entities
- **Proliferation:**
  - Transfer of technology from a possessor to a non-possessor
    - '*Horizontal proliferation*': lateral spread
    - '*Vertical proliferation*': weapon acquisition and improvement (= armament?)
  - Essentially a trans-national process
    - May be domestic in case of transfers to criminal or terrorist entities
  - Has a *supply* and a *demand* dimension

# Armament dynamic

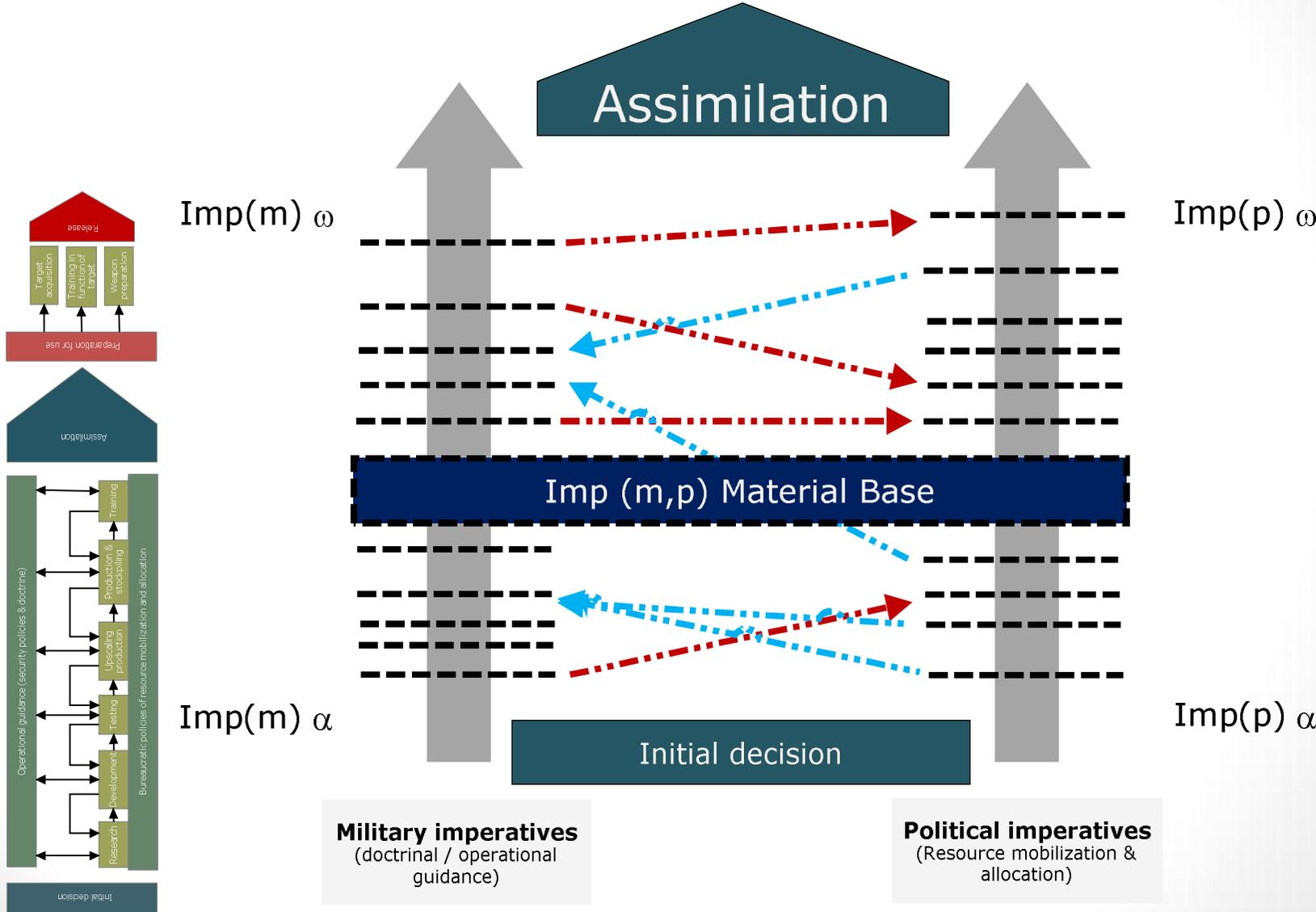


# Assimilation

Assimilation is the *process* by which for a particular type of weaponry the *military and political imperatives*, as constrained by the political entity's *material base*, become *reconciled* with each other, so that the weaponry becomes an integral part of *current mainstream military doctrine*.



# Material base



**Military imperatives**  
(doctrinal / operational guidance)

**Political imperatives**  
(Resource mobilization & allocation)

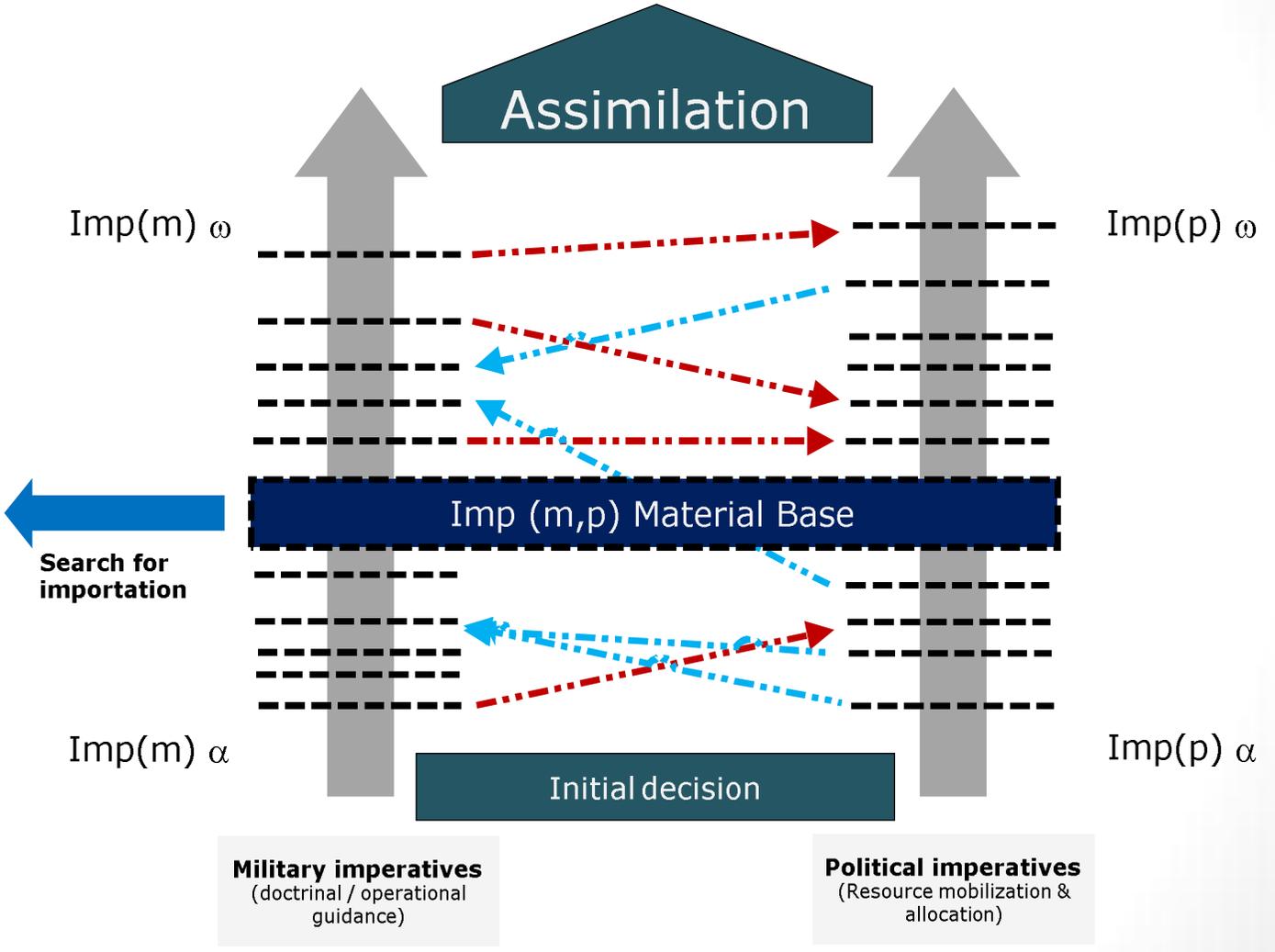
# The material base as an enabler or impediment

- Two major components
  - *Physical base* (essentially unchangeable variables)
    - Geographical location; territorial size
    - Population size
    - Presence of natural resources; easy access to natural resources
  - *Societal base* (variables that can be changed over a long period, but armament @urgency)
    - Political culture
    - Level of education
    - Scientific and technological base
    - Industrial development and economic strength
- Particularly important independent variable as it **cuts through both** the political and military imperatives tracks

# Role of the material base

- Critical to the demand-side understanding of proliferation
- Scarcities of certain resources
  - Certain natural resources
  - Insufficiently advanced educational base; technical skills
  - Insufficient R&D and industrial base
- Two basic options:
  - Develop the missing ingredients indigenously
  - Seek the missing ingredients abroad (legally or illegally)
- However, what about the physical base; time constraints?

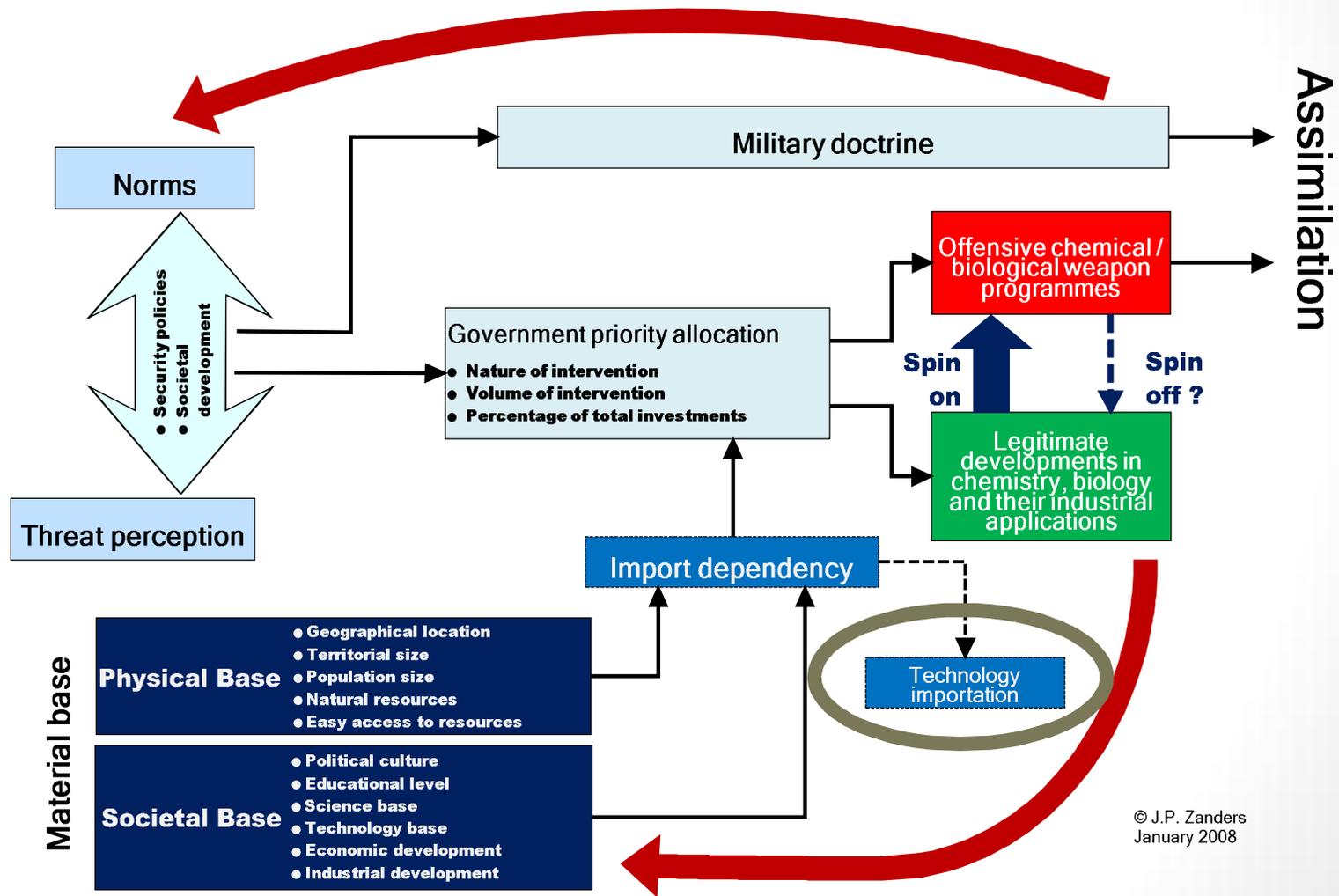
# Demand-side of proliferation



**Military imperatives**  
(doctrinal / operational guidance)

**Political imperatives**  
(Resource mobilization & allocation)

# Non-proliferation policies: Targeting the supply side



Part 4

# THE '*DUAL-USE*' CHALLENGE

# What is '*technology*'?

## 'Technology comprises

- the *ability* to recognise technology problems,
- the *ability* to develop new concepts and tangible solutions to technical problems,
- *the concepts and tangibles* developed to solve technical problems, and
- the *ability* to exploit the concepts and tangibles in an effective way.'

Errko Autio and Tomi Laamanen, 'Measurement and evaluation of technology transfer: Review of technology transfer mechanisms and indicators', *International Journal of Technology Management*, Vol. 10, Nos. 7/8 (1995)

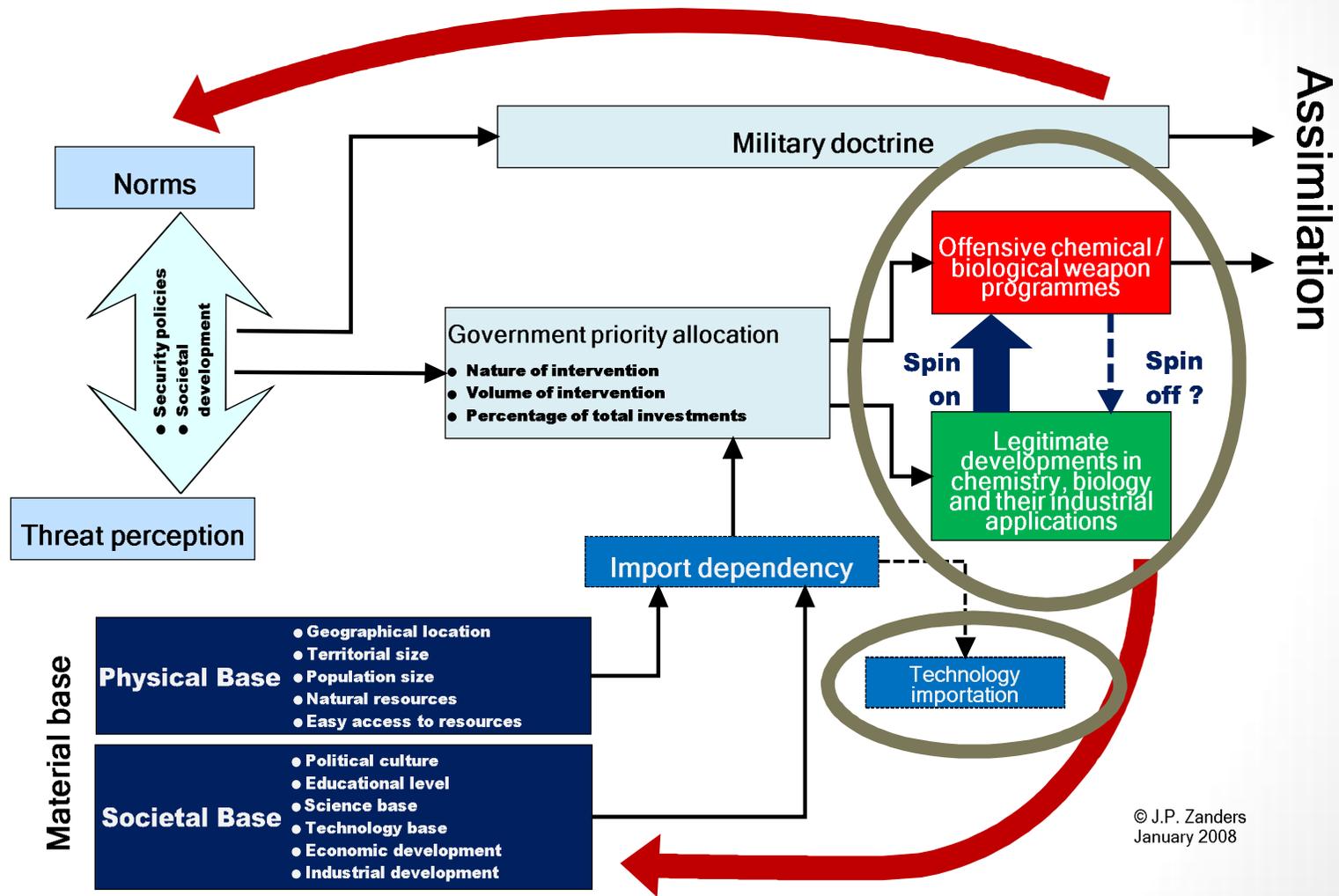
# Tangible and intangible technology

- **Tangible objects or artefacts**
  - Pathogens, chemicals, toxins
  - Laboratory equipment
  - Fermenters, production installations
  - Delivery systems, special equipment
  - Etc.
- **Intangible technologies**
  - Data
  - Processes
  - Knowledge
  - Expertise and skills
  - Etc.
- **Transfer types**
  - Across borders between different economic units
  - Across borders within the same economic unit (e.g., intranet)
  - Between economic units inside state borders

# Dual-use technology

- **Dual-use technology**: a technology that has the *potential* to be applied for a purpose other than the one for which it was originally intended
  - *Spin-on*: military application of technology originally intended for civilian purposes
  - *Spin-off*: civilian application of technology originally intended for military purposes
- **Single-use technology**: a technology that lacks such potential (e.g. the weapon itself)
- **Note:**
  - No trade in CBRN weapons
  - Transfers involve dual-use technologies *underlying* CBRN weaponry → *core of the challenge*

# Dual-use challenges in weapon control



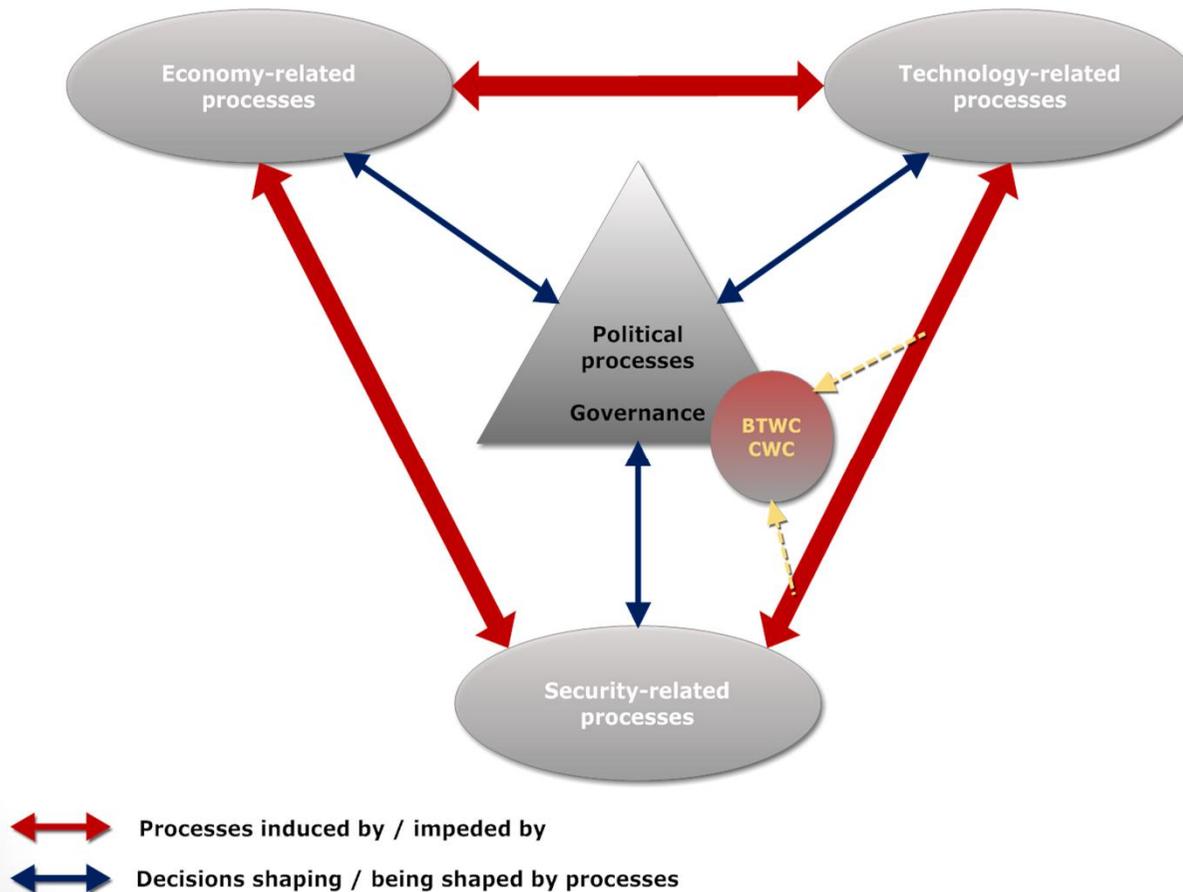
Part 5

# WHY TECHNOLOGY TRANSFER CONTROLS ARE IMPORTANT TO YOU ...

# Entrance of the *post-proliferation era*?

- **Nuclear:**
  - Global warming and growing interest in nuclear energy
  - Commercial pressure to access new markets
    - e.g., US-India & US-UAE bilateral agreement; Saudi Arabia forthcoming
- **Biological:**
  - Biology and biotechnology critical to development & health
  - Many developing countries conduct leading-edge research
  - Education expanding everywhere: spread of knowledge to manipulate pathogens, including genetics
  - Biotechnology is essentially information: no physical goods to cross borders
  - Corporate acquisition and sell-offs
- **Chemical:**
  - Similar to biological
  - Many production facilities with potential for CW manufacture now located in developing world

# BTWC & CWC in a polycentric world



- § No unified model for governance of weapon control anymore
- § New stakeholders and security actors
- § Increased role of non-state national & transnational actors
- § Shifting relative balances of powers (economy, politics, military) and multiple power centres
- § Geographical decentralisation of business and industry activities
- § South-south trade patterns and impact on technology diffusion
- § *Declining role of states in shaping developments, but many states reject formal governance responsibilities for non-state actors under BTWC & CWC*

# The Future: Multi-layered & multi-sectorial governance model?

- **Weapon control**
  - Multilateral agreements (Geneva protocol, BTWC, CWC)
  - Proliferation prevention arrangements (Australia Group, PSI, Global Partnership, etc.)
  - UN agencies: UNSC, UNODA, 1540 Committee, UNEP, UNDA, etc.
  - National laws and regulations (criminal, penal, trade, safety, etc.)
- **Disease prevention**
  - WHO, FAO, OIE + their regional organisations/initiatives
- **Crime and terrorism**
  - UNSC Resolutions (1540, terrorism resolutions, etc.)
  - Interpol, Europol, etc.
- **International transfers**
  - WTO, WCO, etc.
- **Economic actors**
  - **Companies** (national, multinational, transnational)
  - **Research institutions**
  - **Individuals**
- **Instruments of collective & individual governance**
  - Codes of conduct; Professional codes; Ethics
  - Awareness-raising & education
  - Whistle-blower protection schemes

# National implementation = key aspect

- 'Any necessary measures'
  - Wide range of legislative and regulatory tools available
- Penal legislation
  - Deterrence and prevention
- Criminal procedural legislation
  - Enable investigation and prosecution of CBRN-related crimes
    - Before an incident (→ in the CBW context, incorporation of the *General Purpose Criterion*)
    - After an incident
- Transfer controls
  - Import, transit and export control legislation
  - Legislation governing domestic transfers of materials (terrorism & crime)
  - Legislation must cover all actors involved in the transfer process
- Authorisation of legitimate activities
  - Registration and licensing of legal and natural persons and certain types of activity
  - Transport and storage regulations
  - CBRN safety and security policies
    - Government level
    - Company level
    - Individual level

# Education about export controls ...

- Is about changing attitudes of individuals or groups
  - Audiences need to acquire enhanced awareness about the potential implications of their activities and individual actions
  - They must be able to identify and assess short-term and longer-term risks and threats
  - They must acquire situational awareness to maintain standards of responsible behaviour
- Knowledge transfer is insufficient to shape attitudes
  - Audiences need to be engaged
  - They need to discover for themselves *why* the issue area is important / relevant to them
  - They need to discover *how* they can mitigate risks and threats
  - The insights need to become part of the daily professional routine



# THE TRENCH

**Recalling** where science, industry and military art converged  
**Challenging** entrenched positions

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