CBRN Weapons
Security Challenges and Their Control

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Part 1

WHAT IS ‘CBRN’?
An acronym never to forget

• CBRN: a collective term for 4 distinct weapon categories
  • Chemical weapons
  • Biological weapons
  • Radiological weapons
  • Nuclear weapons

• Nevertheless, the boundaries between the weapon categories are fuzzy
  • Certain weapon types share characteristics with two or 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

- Biological
  - Toxins & Bioactive molecules
- Chemical
- Smoke
- Incendiary
- Nuclear
- Radiological
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

- **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 of 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)

• Regional (multilateral)

• Bilateral
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
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
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 \(\equiv\) 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

Assimilation

Imp(m) $\omega$

Imp(p) $\omega$

Imp(m) $\alpha$

Imp(p) $\alpha$

Search for importation

Initial decision

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.’

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

- Norms
- Security policies
- Societal development
- Threat perception
- Physical base
  - Geographical location
  - Territorial size
  - Population size
  - Natural resources
  - Easy access to resources
- Societal base
  - Political culture
  - Educational level
  - Science base
  - Technology base
  - Economic development
  - Industrial development
- Government priority allocation
  - Nature of intervention
  - Volume of intervention
  - Percentage of total investments
- Import dependency
- Military doctrine
- Offensive chemical / biological weapon programmes
- Legitimate developments in chemistry, biology and their industrial applications
- Technology importation
- Assimilation
  - Spin on
  - Spin off
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