CBRN Weapons
Security Challenges and Their Control

Dr Jean Pascal Zanders
The Trench

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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

Assimilation

Imp(m) $\omega$

Imp(m) $\alpha$

Imp (m,p) Material Base

Initial decision

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 \(\approx\) 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

Initial decision

Political imperatives
(Resource mobilization & allocation)

Military imperatives
(doctrinal / operational guidance)

Assimilation

Imp (m,p) Material Base

Search for importation

Imp(m) ω

Imp(m) α

Imp(p) ω

Imp(p) α
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

- Military doctrine
  - Government priority allocation
    - Nature of intervention
    - Volume of intervention
    - Percentage of total investments

- Import dependency
  - 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

- Offensive chemical / biological weapon programmes

- Legitimate developments in chemistry, biology and their industrial applications

- Technology importation

Assimilation

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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