

Synthetic biology

Addressing the risk of terrorist application

Dr Jean Pascal Zanders

EU Institute for Security Studies

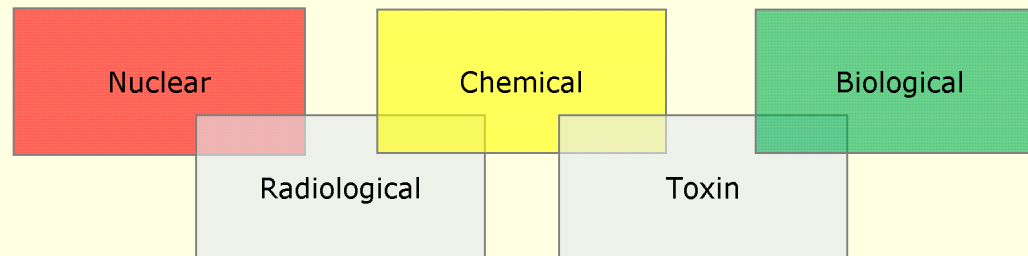
European Group on Ethics in Science and New Technologies

XXXVth meeting, Hearing on 'Ethics of Synthetic Biology'

Brussels, 20 May 2009

Incidents of terrorist use of non-conventional agents

n Non-conventional weapon categories

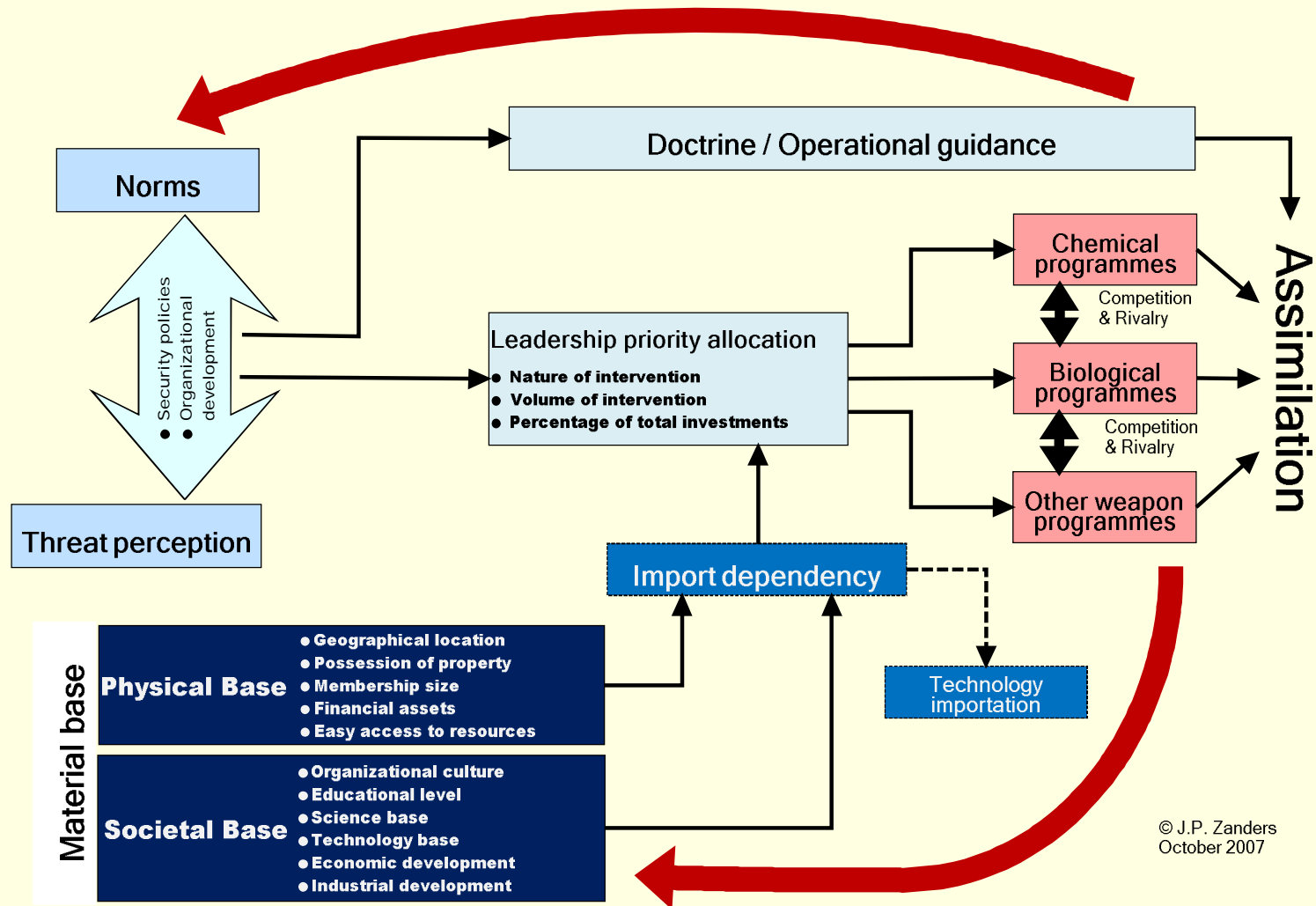


- n Most incidents are in the grey areas
- n Agents in grey areas are easier to acquire
 - n Enable incidents involving individuals; small groupings
 - n Opportunity may play a significant role in those incidents
- n Incidents with biological / toxin agents since 1970 produced fewer than 100 fatalities, despite biotechnology revolution

Organising terrorism with biological agents for mass casualties

- n Highly (vertically) integrated organisation
 - n Charismatic leadership
- n Skills required within organisation
 - n Cannot be hired
 - n Specialists must be convinced of organisation's ideology
- n Functional specialisation
 - n Different steps in armament dynamic require specific skills
 - n Places burden on recruitment of specialists
 - n Failure to do so has major impact on both armament dynamic and ability to deploy and use weapons
- n Elaborate preparations needed (large footprint)
 - n Research facilities
 - n Testing ranges
 - n Production units
- n Logistical burden
 - n Technology acquisition (high import dependency)
 - n Weapon deployment
- n Dissemination may be technologically most challenging

Complexity of the armament dynamic



Assessing the terrorist threat

- n Since the demonstration of recombinant DNA techniques in early 1970s:
 - n Explosion of biological research and biotechnology applications
 - n Parallel development of concern about next-generation BW
 - n Integration of several scientific disciplines
 - n Synthetic biology offers a new dimension to the debate, but not a novel challenge
- n From the perspective of terrorism involving biological agents
 - n The acquisition process is complex for the potentially most destructive agents
 - n Synthetic biology adds another layer of complexity
 - n Presently gravest challenge may come from (rogue) individuals with access to BSL-3/4 labs

General issues for concern

- n **Commercially-driven imperatives**
 - n Determines type of research and development
 - n Standardisation of DNA strands offers huge commercial incentive
 - n Companies are already being created
 - n Allows for niche research and development based on different imperatives
 - n Within own society
 - n In other countries (some of whom may be of potential concern)

- n **Accessibility is increasing**
 - n Broadening basis for biology & biotechnology
 - n Research, production & commercialisation of standardised gene sequences
 - n Access for individual 'hobbyists'

- n **Hobbyists ('bio-hackers')**
 - n Literally work from home (compare with chemistry kits)
 - n Laboratory equipment available from sites such as eBay
 - n Dedicated bio-hacker forums
 - n Standardised DNA strands easily available via Internet
 - n Synthetic biology gave big boost to the movement
 - n Currently known work is harmless, but at least in USA oversight responsibility is unclear

Specific issues of concern

- n Proliferation of high-containment laboratories since 2001
 - n Widening base of people with knowledge & skills
 - n Certain pathogens are being artificially recreated (e.g., polio and H1N1 influenza (1918) viruses)
 - n Accidents (infections, releases) do happen
 - n Terrorism concerns: decreasing transparency and public accountability; reduced peer review opportunities
- n Bio-defence: science-based analysis of the BW threat
 - n Genetic properties of pathogens are being altered to study infectivity, virulence, etc., thus creating modified life forms
 - n Government-run programmes
 - n Insights from bio-defence programmes are useful for offensive BW development
 - n Limited transparency
 - n Questions about adequacy of vetting procedures for researchers
 - n Anthrax letters (2001) came from a government bio-defence laboratory
- n Limited knowledge among scientists about norms against BW
 - n Potential contribution to future BW development rejected out of hand
 - n Development of enabling technologies: future tangibles or end products not yet known
 - n Situation probably even worse among 'hobbyists'

General recommendations

- n The time is still available for a balanced and comprehensive policy
 - n Terrorist threat from synthetic biology presently low
 - n Largest threats potentially from state-run bio-defence programmes and proliferation of high containment laboratories
 - n Spread of skills and materials
 - n Rogue individuals
 - n Accidents
- n Insert challenges of synthetic biology into overall policies on BW prevention
 - n Multi-level stakeholdership (government, companies & institutes, individuals)
 - n Raise issue awareness (e.g., stimulate debates on professional codes) and build stakeholdership among relevant constituencies
 - n Development of transparency-enhancing in cooperation with industry and scientific community to promote early detection of deviance and malfeasance
 - n Licensing requirements for private and legal entities (possession; transfers)
 - n Gives overview of activities and their location (+ tracking of changes in location)
 - n Gives degree of control over access to technologies
 - n May bring hobbyist activities into the picture
 - n Identifies and establishes responsibilities for oversight and enforcement of regulations
- n For EU-funded research projects:
 - n Standardised criteria for assessment of different types of bio-risk
 - n Commitment to transparency and peer review
 - n Monitoring mechanism for subsequent application of funded research
- n Maximise transparency and public accountability regarding relevant activities and promote common standards among EU Member States

EU-ISS



#On the web

www.iss.europa.eu

#E-mail

jean-pascal.zanders@iss.europa.eu