In co-operation with the International Security Bureau of Foreign Affairs and International Trade, Canada

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CHEMICAL AND BIOLOGICAL WEAPONS: FACING FUTURE CHALLENGES

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Introduction

1. The last decade has seen both negative and positive developments with regard to the problem of chemical and biological weapons (CBW). Whilst there has been a modest decline in the number of states actively pursuing the development of CBW, the nature of the problem has now changed. Three factors contribute to this and to the difficulty of responding to these challenges: advancing science and technology, the range of potential misuse and globalisation.

2. Advancing science and technology increases the options available to actors with potential interest in CBW in terms of means, modes of use and methods by which capabilities can be developed. These options challenge our common notions of what constitutes a chemical or biological weapon, how such a weapon might be used and what is understood by proliferation. The issue of globalisation challenges us not only in terms of the rapidity of the spread of science and technology but also in terms of the numbers of players and the relationship between them. The problem of CBW, in

particular, focuses attention not just on state and non-state actors but also the facilitators and enablers of the development of these weapons. The nature of the relationship between these actors is under-researched: it is not simply a case of understanding that there are more actors involved, but also what position each of these actors has in the development network and the nature of their relationships. In acknowledging the increasing number of actors involved in CBW development it is necessary to recognise that these actors must also be brought into the dialogue about the prevention of development of weapons.

3. The changing nature of the problem presents a significant challenge: to consider the relationship between these factors and the weigh given to each of the component parts. Effective responses require a change in thinking. Solutions must be as multidimensional and multifaceted as the problem itself. Although at the centre of any response must be the norm against their use, it is not enough to think in terms of treaty versus non-treaty; multilateral responses versus unilateral responses; governance versus non-governance. All of these responses are needed and more should be done in a coherent and co-ordinated manner.

Setting the Agenda

4. The threat of disease being used in a hostile manner is considered to have increased. Coupled with this is the perception that it has never been easier to develop these weapons, never been easier to conceal traces of their development and never been harder to fight their effects. In this environment, the Biological and Toxin Weapons Convention (BWC) is a landmark treaty. In the treaty State Parties have a dual commitment to destroy any existing biological weapons and never to arm or rearm. However, there is a need to do more to ensure that the treaty remains relevant to the changing threat environment.

5. There are four contemporary challenges to the BWC: universality; non-state actors; the potential for misuse of the life sciences; and the need to strengthen compliance.

6. There are currently 155 State Parties to the BWC and 16 signatories, leaving some 23 states outside the treaty. Much effort is needed to bring these states into the treaty framework. A similar level of effort is needed to fight bio-terrorism with the full force of available policy options. This includes preventative measures as well as ideas such as the 'Bioforum' suggested in the United Nations Secretary General's Report *Uniting Against Terrorism*. It is important that initiatives such as this do not obscure other efforts, such as the 'real time' responses and the need for synergy between the efforts of the BWC State Parties and organisations such as the World Health Organisation (WHO) and Interpol.

7. The potential misuse of life sciences is critical and there is a need for scientists to become more aware of the dual use potential of their work so that they too adhere to the central norm of the BWC. Education and awareness-raising activities with those who work in the life sciences are effective in this respect but are a much neglected area.

8. Adherence to the BWC and its principles should not, of course, stop at life scientists but be observed by all State Parties to the BWC through faithful implementation of the treaty. Whilst biosecurity and biodefence are vital, these activities need to be open to scrutiny and performed in a manner, which does not impede the advance of science and technology.

9. At the upcoming 6th Review Conference of the BWC, State Parties need to rise above the problems of the past and make a new start. This could include carrying out a constructive and comprehensive review of the convention, overtly recognising that the BWC covers all developments in science and technology. It could also initiate an inter-sessional process with the aim of achieving something tangible and practical. These annual meetings are an opportunity to review activities and provide an essential forum for accountability.

10. In comparison to other weapons of mass destruction treaties, the Chemical Weapons Convention (CWC) is often regarded as the poor relation in the non proliferation agenda. There is a complacent and unhealthy attitude that a chemical weapons incident is no more than an extended hazardous material accident. The

CWC and the related Organisation for the Prohibition of Chemical Weapons (OPCW) need to be endlessly contemporary. The CWC and, in particular, its non proliferation dimension, was negotiated to last.

11. Review conferences have become a familiar pattern in multilateral arms control environments but it is important to remember that in the case of the CWC it is the Conference of State Parties which is the principle governing organ. Review conferences in this domain are therefore simply a crown on those annual meetings, designed to examine the specific operation of the treaty. A review of the treaty includes an examination of its operation as a whole and of the science and technology developments relevant to the Convention.

12. At the First Review Conference, State Parties preferred to review the treaty by clustering issues rather than performing an article-by-article review. The issue of universality formed one such cluster. Currently the CWC is nine members short of the number of States adhering to the Nuclear Non Proliferation Treaty. Some of the nine states outside the CWC are significant countries. State Parties and the OPCW remain preoccupied with bringing these States under the influence of the treaty.

13. A second cluster of issues centres on the general obligations of the CWC and declarations. State Parties reaffirmed Articles 1 and 2 – an action that reinforced the norm by their recommitment to the comprehensive nature of the prohibition.

14. A third cluster of issues concerns the verification provisions of the treaty with State Parties, dealing with a number of declaration-related issues and considering how best to optimise verification systems. State Parties strove to increase the efficiency of the OPCW verification activities by, for example, calling for further improvements to the declaration mechanisms and for the creation of a verification information system to assist in the efficiency and care of OPCW activities and resources.

15. The issue of destruction of chemical weapons and facilities received understandable attention. Technical debates centred on increasing the efficiency of the verification systems, however the progress made in this area and the efforts of

State Parties to fulfil their requirements were recognised. The USA for example has put considerable money and effort into destroying approximately 35% of stockpiles and Russia has new destruction facilities coming on line, showing a strong commitment to destroy remaining stocks.

16. The Second Review Conference is still some time off, but preparatory discussions have already begun. An open-ended working group, chaired by UK with Iran, Mexico, Russia and the Sudan as vice-chairs and serviced by a bureau of support, has been established.

17. The first Review Conference in 2003 provides indicators to what might be topical issues at the Second Review Conference due in 2008. Implementation, for example, will certainly be an issue requiring evolutionary enhancements to ensure that the implementation of the CWC is true to the definition given in the text of the treaty.

18. The role that non governmental organisations and actors other than the State Parties will play at the Second Review Conference is still being considered, but the extent of the contribution within the conference lies with the State Parties.

19. Beyond 2008, there are four issues which are likely to remain: first, continued implementation of the destruction deadlines; second, new possessor states requiring destruction deadlines other than those stated in the treaty; third, the future challenges of science and technology e.g. chemistry's interface with biology and changes in industry organisation; and fourth the non proliferation dimension.

Assessing the Threat: Key Trends and Developments

20. The threat posed by CBW challenges our traditional understanding of concepts such as 'intent' and 'capability' and the changing geo-strategic environment continues to challenge our perceptions about the utility of these weapons.

21. The traditional view of intent is that it drives capability. According to this view, in order to achieve a deployable capability a linear process with known steps is embarked upon. In fact, the process is more dynamic. The emergence of 'latent'

capabilities[1] drives the need to investigate whether the utility of CBW may now be curiosity-driven.

22. The changing geo-strategic environment is also challenging perceptions of utility. Current thinking is in terms of use by state and non state actors. State use is still perceived in the context of battlefield usage, whilst terrorist use is considered in terms of the Aum Shinrykio or AQ Khan models. However, there is a growing trend of 'communal conflicts', such as the Balkans, which may provide a third model. Given the high degree of latent capabilities, it is possible that this could become an environment where CBW may be used.

23. When assessing the threat posed by CBW, the unknown is perhaps more important than the known. Countries have rarely openly discussed their CBW programmes and in today's environment, no country will admit to possessing a programme or show interest in considering a programme. This creates a problem for intelligence assessments about the CBW threat, which in the past have been poor. Intelligence officials have long recognised that a real threat does exist for example, over five years ago George Tenet, the former Director of the Central Intelligence Agency (CIA), said that there was a growing prospect of being surprised by a CBW attack. However, it is difficult to assess its extent due to the nature and pattern of both the CBW threat and the changing character of related programmes. States for example no longer need to replicate the large-scale programmes of the former Soviet Union or the United States so it is questionable if intelligence agencies would be able to identify a footprint of an offensive programme. Indeed research has shown that in the latter years of its programme, the Soviet Union began to move away from large-scale infrastructure and moved instead towards the development of breakout capacities. Given the advances made in production technology and processes, if a future proliferator follows this pathway the footprint of an offensive State-based CBW programme becomes smaller still.

24. There is also increasing concern that non-state actors such as terrorists may investigate the offensive potential of CBW. These actors pose a different kind of

[1] 'Latent' in this context refers to something which is potentially existing, but not presently evident or realised.

threat to their state counterparts and leave different proliferation signatures: for example, it is thought that should a terrorist group be interested in chemical weapons they may be more inclined to exploit readily available industrial chemicals rather than develop and produce their own.

25. The Aum Shinrikyo case is often cited to support or refute terrorist interest in both chemical and biological weapons. However, aspects of the Aum case do not lend themselves to this sort of generalisation. Other terrorists groups that are known to have shown interest in the biological weapons did not follow Aum's behaviour: the Rajnashee cult, for example, tested its 'weapons' before use. Rather than generalising from the Aum case about what terrorists might do, the focus should be on incidents which demonstrate what is actually possible, for example the anthrax letter incidents in the US. Six years ago, it may have been comfortable to conclude that technical barriers were preventing terrorist development of biological weapons, but the anthrax letters show that this is no longer the case. It is no longer sufficient to rely on technical barriers to impede terrorist use of these weapons. There needs to be a greater understanding of what motivates terrorists to use these weapons and their perceived advantages over conventional explosives.

26. There should be a similar understanding of why states might become interested in CBW. It is arguable that there are more reasons for states to be *less* interested in these weapons compared to the Cold War period. This hypothesis may also explain why so few terrorists have gone down the Aum path, remaining attached instead to guns and bombs. Although latent capabilities do exist, especially for biological weapons, the advantages of possessing these weapons are less clear. This does not mean that pressures to investigate their potential will not emerge in the future so attention should be given to the evolution of international relations.

27. As well as treaties that set norms against use and proliferation, the international system against CBW now includes other mechanisms to assess and respond to threats of proliferation. United Nations Security Council Resolution (UNSCR) 1540 requires all states to enact and enforce measures to prevent non-state actors from proliferating weapons of mass destruction, related materials and their means of

delivery, particularly for terrorist purposes. Ostensibly, therefore, the resolution focuses on non-state actor behaviour rather than state behaviour.

28. Resolution 1540 arises from a family of UN Security Council resolutions dealing with counter-terrorism, in particular UNSCR 1373 (28 September 2001) and it is therefore often portrayed as a counter-terrorism measure. However, UNSCR 1540 is not simply a counter-terrorism measure: it is also a non-proliferation and counter-proliferation measure. If implemented and complied with fully by all states the Resolution would have the effect of reducing the opportunities for individuals and other non-states actors to use such weapons, particularly for terrorist purposes.

29. Security Council Resolution 1540 defines a non state actor as an "individual or entity, not acting under the lawful authority of any State in conducting activities, which come within the scope of this resolution". Some characteristics can be ascribed to actors other than a terrorist such as traffickers or technicians who obtain and proliferate CBW at various stages during a weapons' life cycle. Whilst the terrorist as a potential user of weapons of mass destruction (WMD) has been studied for decades, the trafficker is a new type of non-state actor in the non-proliferation field. While UNSCR 1540 affirms the proliferation of WMD as a threat to international peace and security, it also mentions illicit trafficking of these weapons, as "add[ing] a new dimension to the issue of proliferation of such weapons and also poses a threat to international peace and security". Thus, threats concern not only the possible non-state actor as an end-user but also the traffickers or intermediaries, as well as technicians and scientists who have access to the materials and knowledge and who could facilitate the acquisition of a capability.

30. It is often commented that the availability of cheap, commercial and worldwide dual-use CBW technologies means non-state actors of all types have access to them for potential weapons use. UNSCR 1540 paragraph 8d recognises this concern for dual-use technologies by calling on all states to work with and inform industry and the public, including academia, of their legal obligations under 1540. However, even if such technologies are becoming more easily available, the resolution regards those who have direct access to the technology or knowledge about its potential use as 'risky'. Consequently, there needs to be further consideration of the intent and

motivation of non state actors to proliferate or use CBW, rather than confining consideration to the capability of CBW, their delivery systems and their underlying technologies.

31. In terms of threat assessment, the relevant feature of the Resolution is the requirement for each state to submit reports about its efforts or intended efforts to stem non-state actors from acquiring WMD, related materials and delivery means. These reports, while not a direct measure of the volume of threat, provide a baseline of states' awareness and understanding of the threat. By April 2006, two years after the Resolution was adopted, approximately two-thirds of all states have provided reports, with the remaining one-third perceiving the issue to be lower among their other national priorities, or simply lacking the capacity to prepare the reports and to otherwise enforce the resolution.

32. In the first two years of the Resolution, its implementation by States and the work of the 1540 Committee have focused on the preparation and submission of these reports and the required legislation has been put in place. The results of enforcement actions by states can provide some information that confirms or re-evaluates threat assessments.

33. With regard to the more traditional national security threat, enforcement actions that have been undertaken comply with the Resolution calling on states "to promote dialogue and cooperation on non-proliferation" and "to take cooperative action to prevent illicit trafficking in nuclear, chemical or biological weapons, their means of delivery, and related materials". The interdictions of cargo, for example, arising from the Proliferation Security Initiative (PSI) now comprised of more than 65 states, were reported in mid 2005 to be just over ten. Compared to traditional terrorist use of conventional weapons, these interdictions seem to indicate a low volume of the WMD threat in terms of a capability of component parts.

34. Although not widely discussed within the context of UNSCR 1540, the Resolution's attention to enforcement and the results of enforcement activities, such as through PSI, mean that initial risk and threat assessments can be re-evaluated. This assists in clarifying the nature of traditional national security threats and in

obtaining a picture of criminal activities, other than terrorism, that preoccupy the attention and efforts of law enforcement agencies.

New Developments in Science and Technology

35. The amount of information which is accumulating, thanks to the rapid advances in science and technology, is staggering. This knowledge is essential to counter disease and improve health but also has the potential to be misused. This dual use nature of the life sciences raises the dilemma to a new level: there is a need to respond to the rapidity of their development as well as to the complex nature of the advances.

36. As the boundaries between chemistry and biology become increasingly blurred, the ability to separate which scientific and technological advances are most threatening to the CWC and BWC is becoming more difficult. Effective horizon scanning for example now has to operate under a broad mandate covering all scientific and engineering disciplines in order to reduce the chances of missing any advances pertinent to defence and security.

37. Advances in knowledge about infectious disease agents present potential problems in the context of bio-terrorism. For example, advances in understanding of infectious disease biology and epidemiology have been greatly influenced by many different approaches including pathogen genome sequencing for study of pathogen structure, function and evolution. In the last five years, a number of studies[2] applying some of these advances have highlighted the extent of potential duality in advancing life science work.

38. One area of advanced scientific investigation, which has potential high dual use application, is synthetic biology. Synthetic biology is essentially the construction of

[2] In 2001 of an engineered recombinant Ectromelia mouse pox virus that expressed interleukin-4 (IL-4) gene and inadvertently created a lethal virus that kills genetically resistant and vaccinated mice; in 2002 the building of a live poliovirus from scratch, using mail order segments of DNA and the internet available viral genome; in 2003 the creation in three weeks of an infectious bateriophage and finally in 2004 the partial reconstruction of the highly virulent 1918-19 Influenza A pandemic strain, H1N1, to identify what made it so pathogenic.

replicating ‘organisms’. Using biobricks, i.e. sections of deoxyribonucleic acid (DNA) that have ‘universal’ connectors on each end, functional strings of DNA sequence can be assembled to perform specific tasks. It is thought that when this technology is fully matured it will be possible to order biological tool kits to assemble a machine or a replicating synthetic organism to carry out certain tasks.

39. Although not fully matured, synthetic biology is developing rapidly. The biological equivalent of Moore’s Law is Carlson’s Law on DNA sequencing and synthesising. Recent figures show that the rate of sequencing is roughly 10 plant and animal species, and 100 microbial species, per year. If Carlson’s Law is true to Moore’s Law in 30 years time ten million plant and animal species and a hundred million microbial species/strains will have been sequenced. This will mean the capability will exist to assemble complex genomes within the next few decades.

40. The risks and social implications of synthetic biology are many. In social terms bio-engineers aim to do better than evolution and an obvious risk of that pursuit is that somebody, whether a malicious bio-hacker with ransom in mind or a terrorist, will assemble something ‘nasty’. Another serious risk is that something will accidentally escape from a laboratory.

41. Another area of life science research with potential duality is in the advancement of understanding of the immune system, the neuroendocrine system and neuropeptides, which are sometimes called the ‘molecules of emotion’. The two systems (immune and neuroendocrine) are interdependent in their interaction, meaning that manipulation of one system will have profound effects on the other. These systems interact through the action of biochemical substances such as cytokines, hormones and neurotransmitters and whilst the reactions of these systems to bioregulators are normally kept in balance, it can be easily tipped. It is believed that these substances may be an ideal target for manipulation by those possessing malign intent. Cytokines for example, if over produced, can cause severe reactions including septic shock.

42. Use of bioactive substances for either beneficial or malign purposes depends largely upon their target delivery systems. Advances made in nanotechnology, along

with new methods for making substances absorbable through nasal and respiratory tract, may need to be followed closely.

43. Rapid advances in a multitude of scientific and technological disciplines increase the need for an effective review of science and technology relevant to the BWC within the treaty structure. Current procedures to perform such a review may now be inadequate so it is prudent for State Parties to consider other procedures that would allow for more regular reviewing of relevant science and technology. Alongside any revision of the review procedures, supporting structures, such as education and awareness raising activities, should be developed and promoted. This will serve to increase the awareness of the dual use dilemma and ensure that all actors involved in life science work will become more familiar with existing legal mechanisms and relevant risk assessment procedures.

44. The need for such supporting structure is evidence of the changing interface between scientific endeavours and international regulation. In both chemical and biological weapons, scientific change has altered the perceived risks of misuse in ways that mean the day-to-day stewardship of relevant sciences does not lie solely with governments who are party to the CWC and BWC. This should not be taken as a de-emphasis of the role and responsibilities of governments and institutions, but rather an indication that the paradigm of engagement has now irrevocably altered. State Parties to the treaties must now effectively engage with a much wider range of actors in order to reduce the potential risks of misuse.

Responses: Examining the Links between Health and Security

45. According to the World Health Organisation (WHO), the definition of health is “a state of complete physical, mental and social well-being and not merely the absence of disease”. This broad definition promotes the links between health and security beyond the role of public health systems after a biological incident. It raises important questions such as: can health be a security issue?; is it possible to be healthy without security?

46. In relation to infectious disease, the securitisation of health has become politically acceptable. Although there is currently no adequate definition of 'health security', common understanding takes it to mean the convergence between 'people security' and human rights. Consequently, the notion that one needs to be secure in order to be healthy is a recurring theme in discussions, although it is often not fully appreciated that security is a pre-requisite to health.

47. Within 'global health security' debates, infectious disease is seen as a health problem which only becomes a security problem when and if a *'second diagnosis'* (i.e. the judgement that the outbreak is intentional) is made. Many infectious disease outbreaks are naturally occurring but it is necessary for the public health community to prepare for all scenarios whether deliberate, accidental or natural. Within the 'natural' category is the sub-category of laboratory accidents such as the one that resulted in the SARS outbreak. It is expected that, as the number of high containment laboratories working with dangerous pathogens increases, the number of laboratory accidents will also increase.

48. The accepted roles that can be performed by the health sector include disease surveillance and managing outbreak responses. However, if the outbreak of disease is considered suspicious and thought to be intentional then the evidence required for the second diagnosis will be in the hands of public health workers, putting them in a difficult position: it is arguable they are not the appropriate people to make decisions about this second stage. This raises questions about who should hold that responsibility: potentially the affected state or even a country not affected by the crisis. In any case, the evidence of an intentional outbreak must be presented in a manner that can convince the international community.

49. If an allegation of deliberate use is made it is important to understand that the context within which public health services are delivered will be fundamentally transformed in order to ensure human safety and security. This new context may exacerbate an already difficult interface between public health and security officials during the second diagnosis stage. In order to minimise difficulties, it is critical to address these issues before such an event occurs and to have in place agreed

mechanisms and procedures that will allow effective co-operation and action between all responding agencies.

50. Public health officials can play important and very visible roles in preventing and responding to outbreaks of disease, whatever their context, as well as in the preparedness and recovery phases.

51. The WHO has developed a number of tools as part of its response activities. These include an outbreak alert system in which epidemic intelligence is gathered and, if necessary, can be followed up by epidemic verification and public health responses. The organisation also disseminates pertinent information through its Epidemic and Pandemic Alert and Response system found on their website www.who.int. Efforts within the preparedness phase include guidelines to implement the recommendations of its *Public Health Response to Biological and Chemical Weapons* (2004). The security sector (law enforcement, military and intelligence) will need to share detailed information with other sectors, including health, to enable them to undertake measures to manage the risks posed by the identified threats. These guidelines reinforce the need for close collaboration among all relevant sectors in order to effectively prepare for and respond to deliberate threats. Other tools to assist the prevention of outbreaks include the WHO's 3rd edition of the *Laboratory Biosafety Manual* (2004) and 1stedition of *Laboratory Biosecurity Guidelines* published in 2006.

52. If prevention fails, early warnings and rapid responses are needed to minimise disease consequences, whatever the origin or source. Basic surveillance data on the disease event can be used to establish a baseline against which an unusual event can be identified. These mechanisms are already in place in most countries, but gaps still exist. To this end, the revised International Health Regulations 2005 (IHRs), for example, can be viewed as a revolutionary international public health instrument. In recognising that trans-national disease threats can impinge on national security and so need to be solved through international collaboration, countries are now required to develop minimum core public health capacities including meeting 'benchmarks' for better detection and response capacity within countries. The IHRs also lay down clear obligations on the part of countries and

WHO, giving clear responsibilities and tight timeframes for action which will be applicable whatever the source or origin of the outbreak.

Codes of Conduct

53. Whilst recent discussions have shown that society-level codes of conduct for scientists are achievable, the question of the content of those codes remains to be resolved.

54. Codes can be used to achieve a number of aims: they can set out idealistic standards; raise awareness about an area of concern; foster debate; or lay down prescriptions or proscriptions. Although the idea of addressing concerns about CBW through the establishment of a code is not new, the context is. This includes: heightened concerns in Western countries about biological weapons, especially since 2001; repeated claims that research in the life sciences is producing a revolution in the understanding of life processes; unprecedented levels of attention in countries such as the US about the potential for otherwise benign activities in the life sciences to facilitate the viability of biological weapons; and whether controls have to be placed on research and other activities and under what conditions.

55. Within the BWC context, ideas about what kind of code is required, and what such a code might do, have changed since 2001. For example in 2002 the Working Group of the United Nations and Terrorism said that a code could "aim to prevent the involvement of defence scientists or technical experts in terrorist activities and restrict public access to [WMD] knowledge and expertise…" whilst in 2003 a UK House of Commons Science and Technology Committee suggested that those working with dangerous substances and pathogens be subject to "an overt code of conduct linked to professional membership analogous to the Hippocratic Oath". This latter idea, that a code be analogous to some form of Hippocratic Oath, has not received much traction mainly because professional membership within the life sciences do not work in the same way as in medicine or engineering. In the UK, for example there is no scope for incorporating professional membership of the life sciences where such an oath could be effective. Part of the reason for these different

approaches to codes is the lack of limited positive detailed articulations about exactly why a code is needed or what it will do.

56. In terms of specific code activities, two useful contributions have been made to date: it has signalled concern about biological weapons, and it has served as a mechanism to enrol those engaged in life sciences into discussions about what needs to be done to prevent the inadvertent or deliberate spread of disease. However, discussions revolving around content have only shown modest achievements. Useful contributions have been made by some organisations e.g. the International Committee of the Red Cross (ICRC) *Principles* and the American Medical Association (AMA) *Guidelines*, but many codes simply reiterate the basic commitments of the BWC and existing national regulations. Worse still, in some cases the core issues which should form a CBW code have been submerged under other concerns to the point where they have become diluted and beyond contention.

57. Codes will not work unless they are underpinned by educational and awareness-raising activities. In recent workshops on the issue of codes, it was found that a basic dialogue on dual use was a pre-requisite to any detailed discussion on codes. Without such awareness raising activities, it is likely that the same conversation will take place in five years time.

58. Despite the attention that the issue of codes has received in the chemical and particularly the biological environments, the topic will die if governments do not keep State Parties interested in it. Such perceived lack of commitment to the issue has resulted in deep scepticism as to whether the overall substance of what has resulted has been or is likely to be significant.

Intelligence Organisation

59. Another response to the changing CBW threat environment has been a rethink with regard to the gathering and analysis of intelligence data. In October 2005, for example, the *National Intelligence Strategy of the United States of America: Transformation Through Integration and Innovation* was released, in which five points of specific priorities for the US intelligence enterprise were designated:

- Defeat terrorists at home and abroad
- Prevent and counter the spread of WMD
- Bolster the growth of democracy and sustain peaceful democratic states
- Develop innovative ways to penetrate and analyse the most difficult intelligence targets
- Look ahead 'over the horizon' to anticipate developments of strategic concerns and identify opportunities, as well as vulnerabilities, for decision makers.

60. In fulfilling these five priorities, it has been recognised that the intelligence community must reach beyond its own boundaries to a variety of people and organisations for information, insights and capabilities. It has also recognised that new forms and sources of information must be exploited, including open source information and to that end, a National Open Source Intelligence Organisation has been established in the US.

61. As part of its institutional reorganisation, the US National Counter-Proliferation Centre (NCPC) was established in 2005 in line with the recommendations of the 2004 *Intelligence Reform and Terrorism Prevention Act*. It is tasked with providing strategic guidance to the intelligence community and promoting the integration of intelligence activities relating to efforts to halt the proliferation of all WMD. The centre includes teams devoted to countering CBW proliferation. These teams work together when the lines between biology and chemistry merge to create new technologies and agents of possible concern.

62. One of the core missions of the NCPC is to look over the horizon at threats and opportunities that may emerge in the future. This includes trying to anticipate which states might seek to acquire, develop, and proliferate WMD as well as anticipating new technologies that might pose a threat. This translates into the production of intelligence needed to discourage or dissuade potential WMD aspirants; disrupt or impede efforts by hostile states or groups to acquire WMD capabilities or efforts by suppliers to provide such capabilities; defeat any attempt to use WMD against the US or its allies and mitigate the consequences of any use of WMD against the US or its allies.

Future Prospects

63. Before looking at future prospects for countering proliferation, it is necessary to begin by examining the past and the present. In the past, arms control and non-proliferation were about building large, elaborate, single-purpose treaties and associated institutions to try to control the behaviour of other states. These treaties were overwhelmingly security-orientated; although they typically included provisions designed to encourage the peaceful applications of the technology concerned. These provisions were generally thought of as 'sweeteners' to encourage adherence or 'balancing items' in the trade-off between the respective interests of developed and developing countries

64. In contrast, the picture now is more complicated and subtle. On the security side there is much more interest in the threat posed by non-state actors than in states. This has inspired doubts in the minds of many national governments about the utility of multilateral treaties. It has also resulted in some innovative measures such as United National Security Council Resolution 1540 and the Proliferation Security Initiative, both intended to get around the slow cumbersome treaty-making process.

65. The BWC has begun to evolve in a new and innovative fashion, as much outside the treaty regime as within it. Here a range of activities has been growing outside the traditional international security domain. For example:

- Interpol has been developing programmes for helping national law enforcement agencies detect prevent and respond to bioterrorism
- The WHO has adopted new International Health Regulations with mandatory reporting requirements that apply to both natural disease outbreaks and deliberate or accidental releases
- There is increasing co-ordination between a range of UN agencies and international organisation in developing response capabilities and contingency plans for dealing with nuclear, chemical or biological incidents and the associated consequences (decontamination, treatment, mass movement of people)

- The scientific community has been considering the role of scientists in preventing the misuse of science and technology and looking at codes of conduct, educational programmes and similar measures.

66. These initiatives and activities provide a surprisingly comprehensive range of international tools to prevent and respond to biological weapons proliferation and use. It is notable that these capacities have been developed without a single new treaty or institution.

67. These developments illustrate the growth of a network approach to dealing with biological weapons and related problems outside the security sphere: an interlinked series of measures to deal with an interlinked series of problems. Rather than negotiate a stand-alone treaty or set up a dedicated international organisation to deal with the threat, the 21st century approach is to harness existing capabilities, to link already available resources and to exploit synergies and overlapping interests.

68. This is more than the kind of trade-off seen in the sphere of multilateral environmental agreements: this is component-based multilateralism where existing pieces are put together in new ways to deal with new problems. Importantly it reaches within states to science, industry, civil society and the level of the individual. As more components of the network develop, the number of useful permutations and combinations grow.

69. One side effect of this emerging network is that the traditional opposition of security and development goals is starting to break down. In the past the discourse has been antagonistic and 'tit for tat' but as the network develops and as different players approach different aspects of the biological weapons prevention from their different angles, it is being recognised that security measures are a means of enabling the peaceful applications of technology and promoting development. Biosecurity measures for example are important to keep terrorists away from sensitive agents in the laboratory, but they are also closely connected with biosafety and good laboratory practices.

70. The emergence of this network does not leave the BWC redundant. The BWC has been the catalyst for its emergence and it continues to play two important roles: first as the embodiment of the norm that underpins all efforts against biological weapons; and second as the forum at which these efforts can be co-ordinated. The BWC's 'new process' for example, proved to be a highly fertile process where links were uncovered and synergies revealed. The BWC played an intimate part of the birth and nurturing of the network of activities outside the Convention. This trend will continue.

71. Of particular importance will be the BWC's role as co-ordinator of these activities. Many of these activities do not have biological weapons as their primary focus and may not originally have been intended to deal with them, but in the absence of co-ordination, duplication, waste and confusion are likely. Although the UN Secretary General is perhaps envisaging a new forum when he called for "a forum that will bring together the various stakeholders" in the recent *Uniting Against Terrorism* report, the role is well suited to the BWC.

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