

Chaillot Papers

December 2003

n° 66

Fighting proliferation – European perspectives

Mark Smith, Bruno Tertrais and Jean Pascal Zanders
Edited by Gustav Lindstrom and Burkard Schmitt



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Institute for Security Studies
European Union
Paris

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Director: Nicole Gnesotto

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In recent months no issue has dominated the strategic agenda more than the proliferation of weapons of mass destruction (WMD). Proliferation, from North Korea to India, from Pakistan to Iran, Iraq and Libya and possibly to al-Qaeda cells, has become the major concern of the international community, beginning with the United States. Since he came to office, President George Bush has made dealing with the combined threats of proliferation, terrorism and dictatorships an absolute priority, one that justifies a systematic rethink on alliances, doctrines, strategies and the traditional rules of American policy.

But at the same time no question has been more fiercely debated than the fight against proliferation – not the principle but the way it is conducted in practice. Faced with the options of pre-emptive military strikes or diplomatic pressure, and going to war immediately or renewing the mandate of the IAEA's weapons inspectors, the Atlantic community's reaction was to split apart. Subsequently the world learnt that there was not the slightest trace of WMD on Iraqi soil.

Any assessment of the events of 2003 is therefore bound to be ambiguous. Undeniably, the major risks resulting from any proliferation of WMD are now seen as strategic priorities by all leaders in the West: from the United States to the G-8, from the Atlantic Alliance to the European Union, there has been a general awareness of the dangers, and this has been reflected in numerous high-level texts, declarations, action plans and strategies. Yet on the other hand it would be futile to pretend that the absence of WMD in Iraq has not undermined the credibility of the idea that they represent an immediate threat to the world. If the war against Iraq was in the end launched on a false assumption or for reasons other than those advanced by the United States, how in future is one to judge just how real a threat is, or to distinguish between true proliferation and an ideological interpretation? And how can a sufficient degree of international vigilance be maintained against the background of such a glaring 'error' as that committed over Iraq's proliferation?

These are just some of the questions that led to this Chaillot Paper, edited by two researchers at the Institute, Gustav Lindstrom and Burkard Schmitt. The aim of the paper has simply been to try and identify, by calling on the best available expertise and without any ideological preconceptions, the facts concerning the various types of proliferation (nuclear, biological and chemical weapons, and ballistic missiles), likely trends and the relative urgency and importance of the different aspects of the problem. The assessments made by the authors are doubtless more nuanced than the simplistic slogans commonly encountered in the media of late, but, as in all things, nuances have their values.

Paris, December 2003

Gustav Lindstrom

Curbing the proliferation of weapons of mass destruction (WMD) is important to European policy-makers. This has been especially evident throughout 2003. On 6 June 2003, the European Union unveiled its basic principles for an 'EU Strategy against the proliferation of WMD'. Among its first principles, the EU underscores that 'the proliferation of all weapons of mass destruction (i.e. biological, chemical and nuclear weapons) and means of delivery such as ballistic missiles constitutes a threat to international peace and security'.

The basic principles were quickly followed up by an action plan identifying practical measures to boost EU non-proliferation policies. The plan outlines specific measures for immediate and medium-term action, primarily through the use of diplomatic tools. On 11 November 2003, a Council Common Position was adopted on the universalisation and reinforcement of multilateral agreements in the field of non-proliferation of WMD and means of delivery. One of the key measures posited is the introduction of a non-proliferation clause in agreements with third countries.

A month later, on 9 December 2003, the European Council adopted an EU strategy against the proliferation of WMD. It represents both the culmination and start of a cohesive strategy in the fight against WMD. Besides synthesising previous EU thinking on proliferation, the strategy represents a 'living action plan' whose implementation will be constantly monitored. As noted in the strategy, 'it will be subjected to regular revision and updating every six months'.

There is no doubt that much of the policy work has been fuelled by recent developments on the ground – especially in Iraq. Prior to the war, distress over Iraq's suspected WMD programme brought proliferation to the forefront of the political agenda. Growing American apprehension fed European and worldwide concern. After the war, the inability to find WMD (to date) has reduced the perceived threat posed by WMD proliferation.

None the less, the downgraded status of WMD proliferation post-Iraq is tempered by current events in Iran and North Korea that remind policy-makers of the importance of remaining prudent. In addition, the potential risk of WMD acquisition by non-state actors lurks in the background. As the EU Security Strategy acknowledges, 'the most frightening scenario is one in which terrorist groups acquire weapons of mass destruction'.

This *Chaillot Paper* provides an assessment of the WMD threat to Europe. It does so by considering the main proliferation challenges in the nuclear (including radiological), chemical, biological, and missile technology domains. The threat assessment is complemented with an overview of the existing tools available to address such proliferation. Weaknesses and gaps in current policy-making are identified and analysed. At the end of each chapter, recommendations on how to address the identified gaps are made. The chapters are based on presentations made by the authors at a non-proliferation seminar held at the EU Institute for Security Studies in May 2003. The seminar provided the authors both the opportunity to present initial findings and receive feedback from a variety of experts, policy-makers, and officials concerned with proliferation issues.

In the first chapter, Mark Smith analyses the patterns of missile development and their proliferation. The chapter provides an overview of the missiles of concern, as well as their stage of development. Complementing the technical aspects of the missiles are the political motivations behind such acquisitions. Given these developments, Smith outlines the current threat level posed to Europe. An outlook is also provided giving an indication of the threat picture in the medium to long term. The second part of the chapter assesses the instruments available to curb missile proliferation. Among those examined are the Missile Technology Control Regime (MTCR) and the Hague Code of Conduct (HCOC). The chapter ends with an overview of recommendations for strengthening existing instruments.

In the second chapter, Bruno Tertrais analyses nuclear proliferation trends. The chapter begins with an examination of current supply and demand patterns in the nuclear field. Particular emphasis is placed on countries such as North Korea and Iran. The analysis serves as a basis for several projections concerning the evolution of nuclear proliferation. The implications of these trends are discussed from a European perspective. The chapter closes

with a menu of recommendations aimed at complementing current EU policies in the field.

The third chapter analyses the proliferation threat posed by chemical and biological weapons (CBW). In his analysis, Jean Pascal Zanders discusses the challenges associated with the accurate assessment of CBW acquisition programmes by states and non-state actors. He then turns to current deproliferation regimes such as the Biological and Toxin Weapons Convention (BTWC) and the Chemical Weapons Convention (CWC) – highlighting their respective strengths and weaknesses. The chapter concludes with an overview of the options available to the EU as it strengthens its CBW policy.

This *Chaillot Paper* should be of interest to analysts and policy-makers concerned with proliferation issues. It provides an in-depth study of WMD proliferation patterns and options for coping with these. Its aim is to contribute to current European thinking on the subject following the EU's recent adoption of a strategy against the proliferation of WMD.



Mark Smith

1

Introduction

Missile proliferation has moved up and down the international security agenda over the past decade. Events such as the *Scud* attacks on Saudi Arabia and Israel in the 1991 Gulf War, the publication of the Rumsfeld Commission Report and its apparent vindication by North Korea's launch of a *Taepo Dong* missile in August 1998, and the missile diplomacy of India and Pakistan in the late 1990s, all helped to give prominence to missile proliferation, even as 9/11 gave a brutal reminder of other technologies and other enemies, and warned us not to overstate the missile issue. The latter, and the technical unsophistication of even the most worrying missile technology, led some commentators to argue that the problem was exaggerated, while others still clung to the belief that missiles were the delivery system most capable of very long range and hence the most likely to exert far-reaching strategic effects.

Any assessment of missile proliferation ought therefore to begin by stating why we should be concerned, and which missiles to be most concerned about. Moreover, making an assessment of the instruments for tackling missile proliferation, as this paper is briefed to do, similarly requires an assessment of the technical and political characteristics of the problem in order to properly understand the advantages and shortcomings of the various instruments. This paper will therefore recognise this double imperative, and set out the defining characteristics of contemporary missile proliferation. It will then go on to assess the effectiveness of the existing instruments in terms of those defining characteristics. There are three such instruments: denial of access to technology via the Missile Technology Control Regime (MTCR), the erection of norms against the technology through bilateral, regional or global agreements, and the deployment of missile defences. Although some of these may be ineffectual or even counter-productive in some regions, none should be regarded as generically

incompatible with the others. Indeed, it is very likely that the only sure-fire failure will be a 'one-size-fits-all' approach.

Finally, the paper will look at the role of the EU in export controls, norm-building and defences. The EU is heavily involved in the first, and may well have been the saviour of the second. As an institution it is unlikely to be involved in the third, but there is a good prospect that its member states will.

What is a threatening missile?

Technical characteristics of missile threats

A missile is only a machine; it is the political and military uses to which it is put, rather than the technology itself, that are the principal source of threat.¹ However, this does not mean that missiles are *generically* unthreatening. To understand how a missile may be threatening in technical terms, we must ask which political or military aims are facilitated by the technology. To put it another way, what does a missile *do* better than alternatives?

This instrumental criterion has an immediate answer: missiles are at their most threatening when they are capable of carrying a 500 kg payload a distance of at least 300 km. Those are, respectively, the minimum likely weight of a first-generation nuclear warhead and the minimum distance that can realistically be described as strategically significant. That is to say, smaller *payloads* are likely to be conventionally-armed and shorter *ranges* are likely to characterise only theatre missiles. This means that a state wishing to generate effects at the strategic level of conflict will probably need a 500 kg, 300 km missile to achieve that aim.

Before going further, it should be pointed out that none of the above is intended to imply that conventionally armed missiles are irrelevant. The citizens of the various cities bombarded by such missiles will testify to their destructive power. However, it is also the case that, historically, the use of conventionally armed missiles as strategic weapons does not appear to have been successful. The V-1 and V-2 attacks in the Second World War, the War of the Cities in the Iran-Iraq War, and the *Scud* attacks on Tel Aviv in 1991 all

1. The possibility of accidental launch is sometimes cited as a reason for regarding missiles as generically threatening, but this seems rather unlikely, particularly in the case of developing world missiles, which are mostly liquid-fuelled. Such missiles take a considerable amount of time (2-3 hours at least) to prepare and launch, and the chances of them being launched accidentally seem remote.

produced little discernible effect at the strategic level, despite civilian deaths. The possibility of European cities being targeted by a so-called 'rogue state' in order to deter assistance in regional intervention is often raised, but seems rather unlikely: terror bombing of civilians is very rarely effective. Effective strategic bombardment with conventional weapons calls for the targeting of facilities rather than civilians, and this demands a higher degree of accuracy than most missiles can offer.

The 300-1,000 km *Scud* represents the most widespread missile threat from a European perspective. It is relatively cheap, easily obtainable and easy to use. It has also been the most heavily used, mostly in the Middle East during the Iran-Iraq War and the 1991 Gulf War. Ballistic missiles of this range tend not to confront the problems of the 'Scud barrier', i.e. the technical challenges of producing a missile of greater than 1,000 km range using *Scud* technology.² *Scud* missiles essentially incorporate 1950s-vintage short-range technology, and although it is possible to adapt the missile to fly further, range cannot be extended indefinitely using the same technology. The technical challenges become especially numerous and difficult beyond 1,000 km, when problems of developing extended burn-time of engines, stage-separation, and re-entry vehicles become noticeably more acute.³ The 1998 Taepo Dong test, in which *Scud* technology was apparently used to produce a missile of 2,000 km range, appeared to cast some doubt on the continued effectiveness of this 'Scud barrier', but it still seems to be the case that attaining a range of more than 1,000 km is very difficult without external expertise. The difference in the technical challenges posed by ranges is reflected in numbers: outside the *de jure* nuclear weapon states (China, France, Russia, the United Kingdom and the United States), 23 states have missiles of ranges up to 1,000 km, but only 6 have missiles with a greater range.

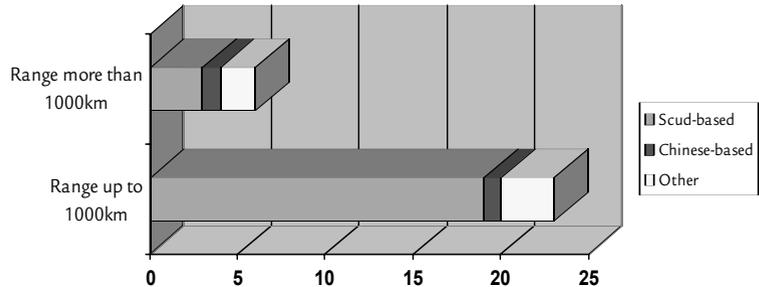
Ballistic missile threats

An assessment of ballistic missile threats quickly reveals that the *Scud* missile remains the base element for current concern. This is illustrated by Fig. 1.

2. Aaron Karp, *Ballistic Missile Proliferation: The Politics and Technics* (Oxford: OUP, 1996). In this paper the term 'ballistic missile' is used to mean both missiles that follow a ballistic trajectory when thrust is terminated and those whose trajectory is controlled.

3. Aaron Karp, 'The New Politics of Missile Proliferation', *Arms Control Today*, vol. 26, no. 8, October 1996, p. 11.

Figure 1: Missile proliferation by type

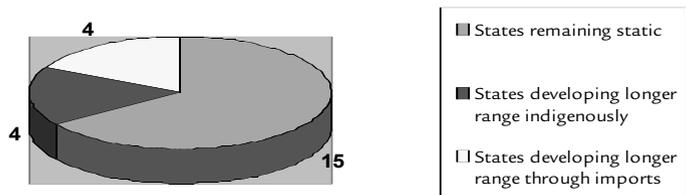


The lower bar identifies missiles that can deliver a nuclear payload of 500 kg up to 1,000 km, such as the Iraqi *Al-Hussein* missiles used to attack Israel in 1991. Of the 23 states with ballistic missiles in that class, fully 19 are *Scuds* or *Scud* derivatives, mostly ageing Soviet stock from the Cold War with ranges considerably shorter than 1,000 km. The Chinese-based one is Pakistan's *Hatf* III and *Shaheen* 1, which seem to be based on the Chinese M-11 and M-9, and the other two are the Indian *Prithvi* and the Israeli *Jericho* 1.

The upper bar shows missiles of 1,000 km range and over, or one that can be interregional. It is a slightly different story here, but *Scud*-based missiles, in this case the Democratic People's Republic of Korea's *Nodong* and its apparent derivatives the Iranian *Shahab* and the Pakistani *Ghauri*, still make up half the total. A possible fourth is the persistent stories about Libya's imports, but those are unconfirmed. 'Chinese-based' refers to Saudi Arabia's ageing Chinese imports, and the other two are the Indian *Agni* and the Israeli *Jericho* 2.

An analysis of *how* those missiles are developing reveals two important insights. The first is the primacy of 'vertical' proliferation.

Figure 2: Patterns of development since 1990



This chart gives an indication of how the problem has developed since 1990, and follows missiles of 500 kg/300 km capability or above. As can be seen, 15 have stayed static in development. These are mostly states from the former Soviet bloc that have retained their Cold War-era *Scud* missiles but not developed capabilities or ranges beyond that. Of the others, 4 have developed longer ranges largely or completely through imports: Egypt, Iran, Pakistan, and Syria. Of those, only Iran and Pakistan have gone beyond 1,000 km range. Four have developed longer ranges mostly indigenously – India, Iraq, Israel and the DPRK, all of which apart from Iraq have gone beyond 1,000 km. The main thing to notice is that there are no *new* missile states. Thus missile proliferation should not be compared to the problem of nuclear proliferation before the Nuclear Non-Proliferation Treaty (NPT), when President Kennedy said there might be 20 new nuclear states by the close of the twentieth century. The problem is not an escalating number of new missile states, but rather the advancing capabilities of existing ones.

The second insight is the prominence of import-dependency. The states that are most active in vertical ballistic missile development are India, Iran, Israel, The DPRK, Pakistan and to a lesser extent Syria, Libya and perhaps Egypt. With the exceptions of the DPRK and India, all of the most ‘missile-active’ states are to a greater or lesser extent dependent on imports. Of the three less active states, Syria has given the most cause for concern with its development of 750 km range *Scud* Ds with the help of the DPRK, but US intelligence has judged it ‘unlikely’ to want to pursue missiles with a range greater than that of the *Nodong*.⁴ Egypt does not possess any known missiles beyond 550 km range, but has sometimes featured as possessing long-range potential.⁵ Libya is repeatedly cited in US intelligence estimates as being interested in acquiring missiles of greater than 1,000 km range, and unconfirmed reports occasionally claim that it has imported *Nodongs* from the DPRK.⁶

Import dependency can be categorised as high, medium or low (see table below). High import dependence can be taken to mean that continued development would be difficult or impossible without foreign assistance, medium that further development would be significantly slowed, and low that development would be hindered but not significantly. As the table below shows, the key sources of foreign assistance are the DPRK, Russia and China. Russia and China both participate in the global export control

4. *Foreign Missile Developments and the Ballistic Missile Threat Through 2015* (Washington, DC: National Intelligence Council, December 2001).

5. ‘Ballistic Missiles: Threat and Response’, Hearing before Senate Foreign Affairs Committee, 106th Congress, April 15 and 20, May 4, 5, 13, 25, 26, and September 16, 1999; available at <http://www.access.gpo.gov/congress/senate/senate11sh106.html>.

6. The US assessment is that ‘If a missile were offered with range sufficient to strike 2,500 kilometers into Europe, Libya would try to obtain it’; see *Foreign Missile Developments and the Ballistic Missile Threat Through 2015* (Washington, DC: National Intelligence Council, December 2001).

system, Russia as a full member and China as an adherent, and therefore need to be induced or compelled to implement existing commitments; the DPRK, on the other hand, is not part of the system.

Figure 3: Import dependency

STATE	SIGNIFICANT SUPPLIER S	LEVEL OF RELIANCE
DPRK	Indigenous	Low ⁷
Egypt	DPRK	Medium/High
India	Indigenous	Low ⁸
Iran	DPRK, Russia, China	High
Libya	DPRK	High
Pakistan	China, DPRK	Medium
Syria	DPRK, Iran	High

Cruise missile threats

Cruise missiles present a different set of proliferation threats. From the point of view of a proliferator state, they have several advantages over ballistic missiles. First, the guidance system is more readily obtainable, given that the Global Positioning System (GPS) is widely available and inexpensive. This means that highly accurate cruise missiles are relatively easy to acquire in comparison to ballistic missiles. It has been estimated that 100 m accuracy is now feasible using the GPS, and 5 m may be a possibility by 2007.⁹ Compare this with the 1,000 m accuracy of the *Al-Hussein* missiles that Iraq fired at Israel and Saudi Arabia in the 1991 Gulf War.¹⁰ Moreover, the MTCR's controls do not apply if the GPS system is intended for use in manned aircraft. A state that is in bad odour with the WMD regimes (such as the MTCR) can expect a refusal of export licence from a member of the MTCR, but the fact that GPS is so widely available makes it difficult or impossible to control fully.

A second advantage of cruise missiles over ballistic is their relative cheapness. The airframe of a cruise missile is similar to that of a light aircraft, the propulsion system is comparatively easy to acquire, and the guidance system has been mentioned. This means that a basic cruise missile represents no great technological chal-

7. The US judges the DPRK to be 'nearly self-sufficient' in missile development. Op. cit. in note 4.

8. India is reported as 'pushing towards self-sufficiency' in US estimation. Op. cit. in note 4. Some assistance is still required if the programme should need to be speeded up. Joseph Cirincione with Jon B. Wolfsthal and Miriam Rajkumar, *Deadly Arsenals: Tracking Weapons of Mass Destruction* (Washington, DC: Carnegie Endowment for International Peace, 2002), p. 198.

9. *Ibid.*, p. 75.

10. Aaron Karp notes that for ballistic missiles, 'guidance is an idea target for export control . . . Apart from Germany and the United States, no country has managed to develop guidance systems for long-range missiles without foreign help'. Op. cit. in note 2, p. 111. See pp. 110-25 for an analysis of the problems inherent in missile guidance systems.

lenge or drain on resources, especially in comparison with a ballistic missile.¹¹ A further advantage is its suitability for delivery of certain kinds of WMD. In comparison with ballistic missiles, a cruise missile flies more slowly, and therefore generates less heat in flight, is endoatmospheric, and does not create a large explosion. It can release chemical or biological agent slowly over a much wider area, with less risk of the agent being destroyed in flight. It has been estimated that biological agent delivered by cruise missile can be lethal over an area ten times greater than that delivered by ballistic missile.¹²

Current cruise threats tend to be sub-strategic in range (i.e. less than 300 km). In fact, one study has estimated that about 90 per cent of existing cruise missile systems have ranges of only 100 km or so.¹³ One reason for this has been the difficulty of producing guidance mechanisms, especially for land attack cruise missiles (LACMs). The sea is relatively flat and thus does not present too many problems for anti-ship cruise missiles (ASCMs), but LACMs need to find their way across varied terrain. The arrival of GPS has, therefore, substantially reduced the technical challenges of developing longer-range LACMs.¹⁴ It has not, however, entirely erased them: using GPS in a cruise missile is not simply a matter of fitting the components into place like a car radio. Integrating complex technologies still represents a major challenge.¹⁵

The other barrier to range extension is also difficult to overcome. Unlike ballistic missiles, cruise missiles are powered all the way through their flight and therefore need to carry fuel for the entire journey. Liquid-fuelled cruise missiles, the easiest to construct, need three times as much propellant as the more advanced air-breathing variety.¹⁶ This problem heavily curtails their range, and helps to explain why so many existing cruise capabilities have sub-strategic capability only. The Chinese *Silkworm* ASCM, for example, has a range of only 90-160 km, and the Russian *Styx* about 80 km.¹⁷ Cruise missiles powered by turbojet engines are much more efficient and consequently have greater ranges, but also present significantly greater technical challenges.¹⁸

Dennis Gormley notes that these challenges are such that a state with '[a] basic level of technological knowledge and capability' that wishes to obtain a strategic-range cruise missile has two choices: to convert a basic ASCM which presents significant challenges, takes several years and requires foreign assistance, or to abandon development and buy a missile outright from a foreign

11. David Tanks, *Assessing the Cruise Missile Puzzle: How Great a Defense Challenge?* (Washington, DC: IFPA, 2000), p. 9; *Jane's Intelligence Review*, April 2000.

12. Dennis Gormley, 'Hedging Against the Cruise Missile Threat', in *Survival*, Spring 1998, p. 96.

13. Op. cit. in note 11.

14. Dennis Gormley, 'Dealing With the Threat of Cruise Missiles', *Adelphi Paper* 339, p. 19.

15. Stephen J. Zaloga, 'The Cruise Missile Threat: Exaggerated or Premature?', *Jane's Intelligence Review*, April 2000, p. 49.

16. Zaloga, p. 49.

17. Gormley, p. 99; Zaloga p. 49.

18. Zaloga, p. 50; Gormley, p. 21.

supplier.¹⁹ In short, the question is of how much, not whether, foreign assistance is required.

Indigenous development is therefore not an attractive option for developing strategic-range cruise missiles, which is demonstrated by the high levels of import dependency in proliferation. Of the 80 states that have cruise missiles of some kind (mostly ASCM), 62 are reliant on foreign assistance.²⁰ Of the supplier states, China, the DPRK, India, Iran, Iraq, Israel and Taiwan are outside the global export control system of the MTCR, although China and Israel are both adherents to the Regime's stipulations. As with ballistic missiles, this means that effective export controls are likely to be a significant brake on development beyond the 500 kg/300 km class, especially as there are very few producers of strategic-range cruise missiles. As evidence of this, a recent US intelligence estimate concluded that 12-24 states will possess some LACM capability by 2015, but that most of those will have ranges of only 'a few hundred kilometers, posing primarily a theater-level threat', unless launched from a forward-based platform such as a ship or aircraft.²¹

Technical characteristics from a European perspective

At the time of writing, the only missiles capable of reaching Europe are in the hands of the *de jure* nuclear weapon states. That is to say, the states recognised as such under the NPT: China, France, Russia, United Kingdom and the United States. To put it another way, no state outside the permanent members of the UN Security Council has a missile capability that could be used against the EU. The only technical factor that can change this in the foreseeable future is the circulation of *Nodong* and especially *Taepo Dong* technology from the DPRK to a state in the Middle East.

The DPRK's *Nodong* missile is the basic design behind the Pakistan *Ghauri* and Iranian *Shahab* programmes. The 1,300 km range *Shahab 3* was reportedly deployed recently, giving Iran a range covering Turkey, the southernmost flank of Russia, and the edge of south-eastern Europe.²² The *Shahab* had the short test programme characteristic of such missile programmes: at most, eight flight tests are believed to have been conducted, not all of them successfully.²³ Its impact accuracy appears to be as much as 2 km, which suggests that it would need a nuclear payload to have any significant effect.²⁴ The *Shahab 3* does have a nuclear-capable payload of 1,000 kg, but Iran's technical capabilities are unlikely to stretch to

19. Gormley, p. 29.

20. Christopher Bolkcom and Sharon Squassoni, 'Cruise Missile Proliferation', *CRS Report for Congress*, Congressional Research Service, 3 July 2002.

21. Op. cit. in note 4.

22. 'Shahab 3 Ready for Service, Says Iran', *Jane's Missiles and Rockets*, August 2003, p. 7.

23. Ibid.; 'Third Iranian Shahab test "a fizzle"', *Jane's Intelligence Review*, November 2000, p. 5.

24. Vasily Lata and Anton Khlopov, 'Iran's Missile and Nuclear Challenge: A Conundrum for Russia', *PIR Report* (Moscow: PIR Centre, 2003).

the miniaturisation techniques needed for constructing a nuclear warhead. As with all missiles, the range can be extended if the payload is reduced. Unconfirmed, but recurrent, reports also suggest that Libya has attempted to purchase *Nodong* technology from the DPRK, which would give it a capability against nearly all of Europe's Mediterranean coastline. These reports have yet to be authenticated, and the fact that to date they have not featured in US intelligence estimates suggests that this remains unsubstantiated.²⁵

In terms of longer ranges, Iran is reportedly developing a 2,000 km range *Shahab 4*, which would increase Tehran's reach into south-eastern Europe. Like the *Shahab 3*, this missile appears to be based on a DPRK design, this time the *Taepo Dong 1*, and probably also the Russian SS-4.²⁶ In order to reach the whole of Europe, Iran would need a missile of at least 4,000 km range, and, as mentioned above, its import dependence is high and therefore it would need substantial foreign assistance. US estimates state that Iran would need to import either a complete system such as the DPRK *Taepo Dong 2* (which has never yet been tested), or some major subsystems such as Russian missile engines to develop long-range missiles.²⁷ Reports have circulated of a *Shahab 4* with a range similar to that of the *Taepo Dong 1*, and also of *Taepo Dong 2* technology supplied by the DPRK, but these remain unsubstantiated.²⁸

The immediate prognosis is that, by 2005, Iran can be expected to have 10-20 *Shahab-3* missiles capable of targeting Israel, Turkey and the south-eastern tip of Europe. It is unlikely to have the 4,000 km range missile at all before 2010 at the earliest.²⁹ This is the only plausible direct threat to European territory, unless Libya or Syria decides to purchase *Nodong* missiles. All other missile capabilities affecting Europe are of less than 1,000 km range and from a European perspective are therefore strictly theatre missiles. Of these, Iran possesses about 300 *Scud Bs* (range 300 km), and 100 *Scud Cs* (range 500 km); Iraq can be assumed to be a defunct threat for the time being; Libya has a small number of old *Scud Bs*, and Syria a stock of *Scud Bs* and *Cs*.

Missile motivations: the political characteristics of missile threats

Missile exports are a source of income for those states that export them, particularly in light of the fact that MTCR deprives the global missile market of most suppliers. The DPRK's missile exports are worth millions of dollars, and the Pyongyang regime

25. Joseph Bermudez, 'Ballistic missile development in Libya', *Jane's Intelligence Review*, January 2003, p. 29.

26. Joseph Cirincione with Jon B. Wolfsthal and Miriam Rajkumar, *Deadly Arsenal: Tracking Weapons of Mass Destruction* (Washington, DC: Carnegie Endowment for International Peace, 2002), p. 267.

27. Op. cit in note 4.

28. Lata and Khlopov; Cirincione et al, p. 264; 'The DPRK: Pyongyang and Tehran Discussing Missile Purchase', *NTI Newswire*, 6 August 2003; http://www.nti.org/d_newswire/issues/thisweek/2003_8_8_misp.html.

29. Lata and Khlopov; Statement of Robert Walpole, hearing on 'The CIA National Intelligence Estimate of Foreign Missile Development and the Ballistic Missile Threat Through 2015' before the Senate Subcommittee on International Security, Proliferation, and Federal Services, 11 March 2002.

has consistently demanded compensation for any cessation. The country has a chronic trade deficit, and limited means to address it. It is generally thought that revenue from missile exports totals roughly \$100 m per annum, and although this is insufficient to cover the trade gap it is none the less a sizeable sum.³⁰ Some reports have put the figure considerably higher, with \$560 m being quoted recently, although this figure may be a hangover from the 1980s when the Iran-Iraq war produced a high demand for *Scud* missiles.³¹

There are signs that Pyongyang might be willing to reconsider its exports, albeit at a high price. Shortly before the 1998 *Taepo Dong* test, the state news agency announced, 'Our missile export is aimed at obtaining money we need at present. As the United States has pursued economic isolation of the DPRK for more than half a century, our resources of foreign money have been circumscribed . . . If the United States really wants to prevent our missile export, it should lift the economic embargo as soon as possible and make compensation for the losses to be caused by discontinued missile export.'³² This demand for compensation, rejected by the United States, was apparently the cause of the breakdown in talks on this issue in 2000. Jang Chang Chon, of the DPRK Foreign Ministry, demanded \$1 billion per year from the US side in exchange for an export ban, and stated, 'The issues of compensation and exports cannot be separated, so we are discussing them together'.

Domestic motivations such as this are not threat-driven, however. Threat-based motivations, or those missiles that are intended by the deploying state to *be* threatening, fall into two categories: bilateral hostility and regional insecurity. The obvious case of bilateral hostility is India and Pakistan, but Iran/Iraq, North/South Korea, and China/Taiwan have all shown how this kind of hostility can be a generator of missile programmes. With the possible exception of India/Pakistan, these bilateral hostilities are also strongly linked to wider regional insecurities that involve other states from outside the region. Iran's strategic calculus needs to incorporate the forces of the United States and its allies, as does that of the DPRK, since South Korea, Japan and Taiwan all have security guarantees from the United States. This means that South Asia is the only 'missile-active' region with no potential enemies outside the region. In turn, this suggests that the missile programmes elsewhere in the world are driven by regionally based security *concerns*, but not entirely by regional *actors*. The involve-

30. Marcus Noland, 'The DPRK's External Economic Relations', Institute for International Economics.

31. The \$560 million figure is cited in 'US Accuses The DPRK of Narcotics Trade', *Financial Times*, 4 December 2002, p. 11. The possibility that this is reliant on outdated sales patterns is raised by David Wright in 'The Case for Engaging The DPRK', *Bulletin of the Atomic Scientists*, March-April 1999.

32. Leon V. Sigal, 'Negotiating an End to North Korea's Missile-Making', *Arms Control Today*, June 2000, p. 3.

ment of extra-regional states such as the United States is a significant driver of proliferation within the region.

This means that talk of 'global' missile drivers is misleading and, very largely, a misnomer. The term had relevance during the Cold War, when it was plausible to talk of a missile dynamic between two states that could conceivably enter into conflict anywhere in the world. It is much less plausible now, when missile dynamics are rooted in regionally based relations rather than global ones. That is to say, the United States and Iraq would not have found themselves in conflict with each other outside the Middle Eastern region; where the United States influences missile proliferation, that influence applies entirely *within* the regional security complex.

Missile motivations from a European perspective

European states only figure in missile drivers in the regional sense: they are not customers for developing world missile technology, they are not suppliers, and they do not have any bilateral hostilities with states of missile concern, but they *are* involved in force projection into regional security problem areas, in particular the Middle East. This means that it is only those European states in these categories that confront a potential missile threat. States such as Turkey provide bases and logistical facilities, and states like Britain are involved in sending troops. In other respects, missile proliferation threatens European states in the sense that it has a negative impact upon regional stability. Thus, European states currently face only a partial direct threat but a strong indirect threat.

This is significant, because European states tend to display a preference for non-military means of dealing with problem states. This was illustrated by the divisions over the war in Iraq, but here the intra-European discord was arguably just as strong as the transatlantic one. However, there are good reasons for regarding Iraq as something of an anomaly. The United Kingdom had been involved in military operations against Saddam Hussein's regime all through the 1990s, from *Desert Storm* to *Desert Fox* to the regular patrols over the no-fly zones, and thus its participation in the 2003 war was much more a continuation of previous policy than a radical departure. Conversely, there has always been noticeable daylight between the British and US policies on Iran.³³

As a consequence, any emerging missile threat to European states may be qualitatively less immediate than for the United

33. For a contrast of EU and US policies over Iran, see Peter Rudolf, 'Critical Engagement: The European Union and Iran', in Richard N. Haas (ed.), *Transatlantic Tensions: The United States, Europe, and Problem Countries* (Washington, DC: Brookings Institution, 1999); Patrick Clawson, 'The Continuing Logic of Dual Containment', *Survival*, vol. 40, no. 1, 1998.

States, which has a far stronger military-political presence around the world. On the other hand, the fact that, where European states do become involved in force projection into the Middle East, they usually do so as part of a ‘coalition of the willing’, may make them more susceptible to missile-based deterrence. A state such as Iran may be able to exercise significant influence over coalition politics by being able to threaten the forces or territories of states considering participating in military action against it. In other words, the deterrent effect of missile attack on the national homeland is considerably higher than that of attacks on forces and logistical facilities; a long-range capability, particularly if (perhaps *only* if) it is coupled with a nuclear capability, significantly changes the strategic relationship.

Summary

To summarise so far, the threat from missiles has the following characteristics:

- above the 300 km range level, it is principally ballistic and *Scud*-based;
- it is largely import-dependent in both cruise and ballistic terms;
- it is evolving vertically rather than horizontally;
- it is driven by regionally-based factors, including the presence or threatened presence of extra-regional intervention forces.

Therefore, the effectiveness of existing instruments should be assessed in light of those four basic characteristics.

Assessing existing instruments

There are three ways of tackling missile proliferation. The first is to cut off access to the required technology, the principle instrument of which is the Missile Technology Control Regime (MTCR). The second is to construct norms to counter possession of long-range missiles. Currently there are very few, if any, norms banning missiles, but efforts to establish them are taking place. The third way is to negate the technology through missile defences. In short, the instruments are denial, delegitimation, and negation.

The MTCR³⁴

The MTCR was established in 1987 and currently has 33 members, with some other states as ‘adherents’ who pledge to abide by MTCR

34. For a detailed analysis of this regime, see Mathieu Grospeud, ‘Le MTCR face à la prolifération des missiles’, *Occasional Papers* 26 (Paris: Institute for Security Studies of WEU, May 2001).

guidelines but are not full members. It is not a treaty, but an informal association of states who agree to restrict exports of missiles, missile technology and missile production technology. Full members attend regular meetings; adherents do not participate in intra-Regime discussions, but agree to place export controls on those technologies stipulated in the MTCR list.

Because it is not a treaty but rather an agreement to ‘sing from the same song-sheet’, so to speak, the MTCR has no verification mechanism and no means by which to enforce compliance by members. However, individual members, especially the United States, have regularly implemented sanctions on states suspected of failing to properly implement export controls. Moreover, in the European case the MTCR’s list of restricted technologies is attached to EU regulations, and therefore covered by EU law and legally binding on member states.

The restricted items are in the Equipment and Technology Annex, and are divided into two categories. Category I is complete missile systems and major subsystems, and export of these items is subject to ‘strong presumption of denial’. Category II consists of subsystems usable for missile development, and production facilities and equipment. Export is subject to ‘case-by-case review against specified non-proliferation factors’, such as possible development of WMD.

The restrictions concentrate on the technology required to carry a 500 kg payload to a distance of 300 km, which combines the estimated minimum weight of a first-generation nuclear warhead with what was thought to be a reasonably strategic range. Later, the rules were extended to cover *any* missile technology ‘intended’ to carry WMD. The aim of the MTCR was always to impede, rather than prevent, missile development. That is not to say that the MTCR founders had no *wish* to see development halted, but that they recognized that export controls could only make the technology difficult to come by.

It will be recalled that the first characteristic of missile threats was that missile proliferation was largely *Scud*-based in nature. The very fact that *Scuds* are the base element is a testament to the MTCR’s success. Any state wishing to develop a long-range missile is forced to work with the same technology that was circulating when the MTCR was set up. This also seems to indicate that, even when MTCR members or adherents fail to comply with their obligations, either by design or through lack of enforcement, the mis-

sile technology that leaks through the export control system is still comparatively basic in nature.

The second characteristic was the dependency on imports of technology, of know-how, or (as in the case of Yemen) of whole missiles. The varying levels of import dependency mean that broadened export controls can have a significant impact. Most really worrying states have a low techno-industrial base, and therefore need imports to keep their missile programmes running. Where these imports involve MTCR members, there may be scope for action, and some MTCR members like Russia, or adherents like China, are believed to be exporting missile technology. They joined the MTCR after its creation, but have regularly been accused of flouting its conditions. The Russian and Chinese exports do not appear to be the result of a deliberate act of policy, but rather are a consequence of 'rogue companies'. Both states have large defence-industrial complexes accustomed to receiving large government contracts; those contracts dried up at the same time as reforms introduced market forces and the profit motive into the domestic economy.

Russian exports of missile technology to Iran are a leading cause for concern. The transfers reportedly consist mostly of guidance technology, the high-strength materials needed for casings and so on, and the sale of expertise and know-how. They seem to take place through a combination of corrupt and underpaid officials in government, impoverished producers hunting for sales, and poorly implemented licensing procedures.³⁵ The United States has repeatedly sanctioned Russian entities despite Moscow's denials, some of which have been indignant, to say the least: in 2001, an official from the Russian Ministry of Foreign Affairs claimed that the issue of Russian exports to Iran was 'a politically and economically motivated fiction promulgated by the pro-Israeli disposition of the US political establishment'.³⁶

The scale and type of export has declined to some extent, especially since Russia joined the MTCR in 1995.³⁷ However, even the offended ministry official acknowledged that 'private proliferation' of technical expertise was taking place, and other analysts paint a fuller picture. Alexander Pikayev, for example, has pointed out that the Russian defence industry needs foreign markets because it cannot sustain itself on domestic ones, and the fact that the MTCR puts states such as Iran off limits to Western manufacturers presents inviting economic opportunities.³⁸ Moreover,

35. Michael Jasinski, 'Russia's Nuclear and Missile Technology Assistance to Iran', Center for Non-proliferation Studies, 26 June 2003; at <http://cns.miis.edu/research/iran/rusnuc.htm>.

36. Yevgeniy Zvedre, 'US Perception of Russia-Iran Relations: Instrumental Distortion', *The Monitor*, vol. 7, no. 1, Winter 2001, p. 3.

37. Dinshaw Mistry, *Containing Missile Proliferation* (Seattle: University of Washington Press, 2003), p. 53.

38. Alexander Pikayev, 'Strategic Dimensions of the Russo-Iranian Partnership', *The Monitor*, vol. 7, no. 1, Winter 2001, p. 7.

Russia's primary source of income is foreign arms sales, which may explain why, as Fred Wehling notes, 'credible reports continue to circulate that the Russian Government has turned a blind eye to the activities of Russian defence firms . . . or has actually assisted their efforts'.³⁹

In China too, it appears that controls are not enforced as rigorously as they ought to be. In 1997, for example, the US Assistant Secretary of State Robert Einhorn testified that the problem might not be deliberate non-compliance: 'as we have learned more about current Chinese procedures for controlling missile-related goods and services, we have become more skeptical about the ability of Beijing's control system to implement missile restraints effectively'.⁴⁰ This was apparently acknowledged in 2002, when it was reported that China had responded to US sanctions over exports to Pakistan by claiming that it was unable to fully control the entities concerned.⁴¹ Chinese export activity has risen sharply over the last twenty years as economic reform simultaneously reduced both export barriers and government subsidising of the defence industry, and consequently exports rapidly outran the government's ability to control them.⁴²

In 1991, China agreed to adhere to the MTCR, although not to join it, and exports of whole missiles were successfully curtailed. However, dual-use exports continued. Beijing responded in 2002 by announcing that its export control list has been updated to closely mirror that of the MTCR, but in June 2003 Chinese entities were again sanctioned by the United States for exports of maraging steel (used in missile casings, not to mention nuclear centrifuges) to Iran.⁴³

There are, in fact, limits to the MTCR's effectiveness as long as some of its members and adherents fail to properly enforce export controls and, equally important, the Regime does not take on all significant suppliers. A law of diminishing returns may be setting in: for a non-MTCR member with exportable missile technology, the incentives to stay out of the Regime become greater as MTCR membership increases, as such a state has the market increasingly to itself. This is highlighted by the case of the DPRK, which has found a bigger market for its unsophisticated *Scud* missiles than would otherwise have been the case. US intelligence sources cite the DPRK as 'the missile and manufacturing technology source for many programs' around the world, and also, significantly given the primacy of vertical proliferation mentioned earlier, the

39. Fred Wehling, 'Russian Nuclear and Missile Exports to Iran', in *The Nonproliferation Review*, Winter 1999, p. 142.

40. Testimony of Robert J. Einhorn, Deputy Assistant Secretary of State for Nonproliferation, Before the Subcommittee on International Security, Proliferation, and Federal Services Senate Committee, Governmental Affairs, 10 April 1997.

41. 'China Protests US Sanctions Over Iran Arms Aid', *New York Times*, 17 May 2002.

42. Testimony of Leonard S. Spector before the US-China Economic and Security Review Commission, hearing on China's Proliferation Policies and Practices, 24 July 2003.

43. Philip C. Saunders and Stephanie C. Lieggi, 'What's Behind US Nonproliferation Sanctions Against Norinco?', Center for Nonproliferation Studies; <http://cns.miis.edu/pubs/week/030530.htm>.

prime source of medium-range (1,000 km and above) ballistic missile proliferation.⁴⁴

It therefore follows that cutting off supply lines of *Nodong* technology ought to have a significant effect on medium-range missile proliferation and hence of ensuring that threatening missile capabilities are largely theatre-range. Unilateral or non-MTCR export controls might be a way forward here. The large amounts of income that missile exports generate for The DPRK were mentioned above, and the Bush administration has consistently refused to bargain with Pyongyang whilst conspicuously avoiding the confrontational stance it took over Iraq. However, the Clinton administration reportedly came very near to reaching a deal with the DPRK. A series of meetings between October 1998 and July 2000 appeared to produce this arrangement, in which Kim Jong Il offered to halt all development and deployment of missiles with 500 km range and over in return for a US promise to launch the DPRK's satellites (the *Taepo Dong* test of August 1998 appears to have been a failed satellite launch), and also a cessation of missile exports in exchange for oil and food aid. According to Gary Samore, 'none of the outstanding issues appeared insurmountable', but the upcoming presidential elections in November 2000 placed constraints on how much Clinton could be seen to bargain with a rogue regime, and effectively there was not enough time to close the deal before then.⁴⁵

The Bush administration has often appeared to be in two minds about the DPRK. On the one hand it has stoutly refused to be coerced into handing over what it would regard as rewards to Pyongyang for proliferant behaviour, but on the other has acknowledged that diplomatic and political solutions may be more productive. This year (2003), it has imposed sanctions on a North Korean company (Changgwang Sinyong Corp.) for missile exports to Pakistan and Iran, intercepted missile shipments bound for Yemen and threatened to close off air supply routes as well.⁴⁶

The third characteristic of missile threats was the primacy of vertical proliferation, and again imports are important here. Strong export controls seem to mean that missiles with a range of over 1,000 km are highly unsophisticated. Of the states currently developing missiles of greater than 1,000 km range (the DPRK, India, Iran, Israel and Pakistan), three appear to be dependent on each other to a significant extent: the Iranian *Shahab*, the DPRK's

44. Statement for the Record to the Senate Subcommittee on International Security, Proliferation and Federal Services on the Ballistic Missile Threat to the United States by Robert D. Walpole, National Intelligence Officer for Strategic and Nuclear Programs, 9 February 2000; Statement of Robert Walpole, hearing on 'The CIA National Intelligence Estimate of Foreign Missile Development and the Ballistic Missile Threat Through 2015' before the Senate Subcommittee on International Security, Proliferation, and Federal Services, 11 March 2002.

45. Gary Samore, 'US-DPRK Missile Negotiations', in *Nonproliferation Review*, vol. 9, no. 2, Summer 2002, pp. 16-20.

46. US State Department statement, 1 April 2003.

Nodong and the Pakistani *Ghauri*. The DPRK has deployed at least 100 *Nodong* missiles but has reportedly only conducted a single test, whilst the *Shahab* and *Ghauri* (the *Nodong*'s apparent derivatives) have been tested on several occasions. It has been suggested that Iran and Pakistan may have part-funded the programme in exchange for the technology, and that test data on *Nodong* derivatives has found its way back to Pyongyang.⁴⁷

Be that as it may, it is certainly the case that vertical proliferation and import dependence rise in direct proportion to one another, and thus maintaining controls on vertical proliferation will depend to a large extent on how effectively supply lines can be restricted or cut off. We have seen that the principal supplier of 1,000 km-plus range missile technology, the DPRK, can potentially be induced to cut its supply, and Russia and China have both made commitments to enforce their controls more stringently. If these three sources of exports can be staunched, it is quite possible that further upwards development by Iran and possibly by Pakistan can be cut off.

The final characteristic was the primacy of regional dynamics. Here the MTCR has a serious problem, which stems from the fact that its members and adherents have far and away the most sophisticated and longest-range missiles. Moreover, those same states, particularly the United States and its allies, have substantial ability to project military power into regional security complexes – a significant driver of missile proliferation. Pakistan, a persistent and vehement critic of the MTCR, highlighted this when it said that 'States which reserved the right to deploy thousands of missiles are now seeking to prevent developing countries from developing missiles for legitimate self-defence. The international community must resolutely resist that discriminatory trend.'⁴⁸

The HCoC

The Hague Code of Conduct Against Ballistic Missile Proliferation (HCoC) was launched in November 2002, after being drafted within the MTCR. Its basic purpose was twofold: to begin a process of global norm-construction on ballistic missiles, and to try to offset their most destabilising effects. It tried to achieve this through a system of annual declarations on missile and space launch vehicle (SLV) policy, pre-launch notification (PLNs) of missile flight tests, and a plea to restrain and where possible roll back missile development.

47. Michael D. Swaine with Loren H. Runyon, 'Ballistic Missiles and Missile Defense in Asia', *NBR Analysis*, vol. 13, no. 3, June 2002.

48. Promotion of Nuclear-Weapon-Free Status of Southern Hemisphere Called For in Draft Resolution Approved by First Committee', UN Press Release GA/DIS/3192, 31 October 2000.

It is hard to assess the HCoC's effectiveness, for two reasons. First, it has only recently been signed, and second it has had such a disappointing signatory list. Apart from Libya, not a single non-MTCR member with significant missile programmes has chosen to sign it. Moreover, the HCoC is little more than a schedule of confidence-building measures, and as such is not designed as a genuine non-proliferation instrument. Unlike the MTCR, the HCoC is applied to behaviour rather than hardware, as Sidhu and Carle have pointed out.⁴⁹ The MTCR works by cutting off access to technology and thereby substantially raising the financial and technical costs of missile development; the HCoC is intended to work by developing 'responsible missile behaviour', a phrase that was much in use during its drafting process but dropped from the final text. Thus, the HCoC attempts to pick up where the MTCR leaves off: those states that have persisted in development despite the MTCR's restrictions will, it is hoped, consent to be 'responsible' with the missiles they have.

That said, the HCoC is clearly aimed at the key characteristics of missile threats. It focuses entirely on ballistic missiles capable of carrying WMD, and therefore the 500 kg/300 km *Scud* and above falls squarely within the Code's remit. The HCoC also has a clause committing signatories not to contribute to, support, or assist ballistic missile programmes in states that might develop WMD in contravention of the regimes or the norms established by the regimes, and commits signatories to exercise 'maximum possible restraint' in development, testing and deployment, although it does not specify what 'restraint' is.

Missile defence

Missile defence is almost as undeveloped in technical terms as norm-building is in political ones. Its feasibility is yet to be conclusively demonstrated but the Bush administration has pressed ahead, with deployment scheduled for 2004. Missile defence is philosophically closer to the MTCR than the HCoC, since it is a means for responding to missile proliferation to be imposed rather than agreed upon. It is beyond the scope of this paper to offer a technical assessment of missile defence, but, as with the HCoC, it is worth assessing how it measures up to the defining characteristics of missile proliferation.⁵⁰

First, the ubiquity of *Scud*-based systems may be an advantage for missile defence, as it means that they are unsophisticated and

49. W. P. S. Sidhu and C. Carle, 'Missile Controls: Blind Spot or Blind Alley?', in *Disarmament Diplomacy*, August 2003.

50. For an argument in favour of BMD's ability to curtail regional ambitions of 'rogue states' see Victor Utgoff, 'Proliferation, Missile Defence and American Ambitions', *Survival*, vol. 44, no. 2, pp. 85-102. For a critique of the supporting case, see Steven E. Miller, 'The Flawed Case for Missile Defence', *Survival*, vol. 43, no. 3, pp. 95-109.

therefore will be vulnerable to missile defence at an early stage in BMD development. The *Patriot* experience in the 1991 Gulf War did show that lack of sophistication can be an unexpected asset – the *Scuds* tended to shed a lot of debris on re-entry which confused the *Patriot* system and made it harder to lock on to the target. None the less, *Scuds* are likely to be vulnerable to missile defence soon, assuming technical problems can be overcome.

The widespread import-dependency may also be an asset. The circulation of *Scud*-based technology does mean that there are several basic similarities in missiles deployed in north-east Asia and the Middle East, which may work in missile defence's favour. Experience gained against Iraqi *Scud*-based missiles is likely to be applicable to similar missiles deployed by the DPRK. This also means that vertical proliferation may also be susceptible to missile defence. If the same states are circulating similar technology, such as the *Nodong* missiles cited by US intelligence as the prime element in medium-range missile proliferation, then successful defence against a *Nodong* in a north-east Asian context substantially raises the prospect of similar success against a *Shahab* in the Middle East. The question here is whether the technical problems of missile defence can be resolved so as to keep pace with the vertical proliferation of ballistic missiles.

Cruise missile defence presents a different set of technical challenges. Cruise missiles do not fly at the same enormous speeds as ballistic missiles, but they are relatively small and therefore present a much smaller radar signature. Moreover, they fly at low altitudes, which means they can drop below radar cover. For example, an official US report in 1999 stated that, due to the curvature of the earth, a cruise missile might not be detected by ground-based radar until it was as close as twenty miles away.⁵¹

In terms of regional dynamics, missile defence may be part of the proliferation problem. A potential adversary's forward-deployed forces and highly sophisticated deep-strike and PGM capabilities, which regional states cannot match, appear to be important drivers behind missile acquisition. Missiles represent one way by which states attempt to acquire some deterrent capability against these interventionist forces near their borders, and therefore missile defence may address a symptom whilst failing to deal with the underlying cause. On the other hand, by negating the potential emergence of long-range missile capabilities in the hands of unpredictable and possibly dangerous states, defences

51. 'Cruise Missile Defense: Progress Made But Significant Challenges Remain', *Report to Chairman, Sub-Committee on Military Research and Development, Committee on Armed Services, House of Representatives* (Washington, DC: GAO, 1999). See also David Tanks, *Assessing the Cruise Missile Puzzle: How Great a Defense Challenge?* (Washington, DC: IFPA, 2000).

do hold out the twin prospects of maintaining the strategic status quo and erecting disincentives for missile development. In addition to the fact that the existence of global export controls raises the technological, financial and political means required for successful missile development, defences can reinforce this by making missiles an unattractive end.

Summary

Of the three instruments for combating missile proliferation, two remain chronically undeveloped in political and technical terms. The HCoC remains the only demand-side political tool and is very much in its infancy, and missile defence has yet to be technologically proven. Moreover, only the MTCR and the HCoC offer any role for the EU, which is more of an economic and political actor on the international stage than a military one. The recent war in Iraq graphically demonstrated how far EU members are from being willing or able to act collectively, in military terms, outside the European continent in the absence of explicit sanction from the UN, and in any event many EU members lack both the means and the desire to project military force beyond the Continent.

For this reason, for the purposes of this paper I propose to concentrate on Europe's role in developing and enhancing the other two instruments: export controls and norm-building. This is not to suggest that missile defence will be an irrelevance for the EU or its members, but simply that export controls and norm-building are political and economic tools, and as such are best suited to the EU, which is after all a political and economic entity rather than a military one.

Improving existing instruments

Export controls: what needs to be done?

We have seen that import dependency is still fairly widespread, particularly among states geographically close to Europe: Iran, Libya and Syria all require significant levels of foreign assistance to make continued progress in vertical development, and only Iran has any possibility of becoming a threat to territorial Europe rather than only to forces. The sources of this assistance are China, Russia and the DPRK, all of which have, in their different ways, demonstrated at least a willingness to exercise stronger controls over the exports. The picture is, therefore, a comparatively encouraging one: the

most worrying proliferation requires foreign assistance, and therefore wider and deeper export controls should have a significant effect. The task for the EU is to cut the supply lines, and/or to encourage suppliers to show greater restraint.

In terms of cutting supply lines, action is already being taken. Not long after China announced its revamped export control list, the United States imposed sanctions on a Chinese company, Norinco, for exporting MTCR Category II items to Iran. Category II items are dual-use items and materials, which should only be exported when there is reliable end-use verification that the materials are not being put to missile use. In the Norinco case, the items were not specified but reportedly included maraging steel, a high-strength material used, as mentioned earlier, in the construction of missile casings as well as nuclear centrifuges. According to Paula DeSutter, the US Assistant Secretary of State for Verification and Compliance, Norinco's exports to the United States are worth about \$160 million, and thus the sanctions are likely to have significant effect.⁵²

Shortly after this, the United States collaborated with Spain to intercept a DPRK export of *Scud* missiles bound for Yemen. The cargo, which consisted of 15 *Scud* Cs with warheads and 23 tanks of oxidiser for missile fuel, was in international waters when it was intercepted. After angry protests from Yemen and the DPRK, and a Yemeni assurance to Washington that the missiles were for purely self-defensive purposes, the United States released the cargo after admitting that it had international legal authority to stop the ship but not to seize the cargo.⁵³

These two events may have been instrumental in the establishment of the Proliferation Security Initiative (PSI) on 31 May 2003. The PSI was set up to pursue the 'pre-emptive interdiction' of missile transfers. Such interdiction is illegal in international sea- or airspace, as the United States discovered with the DPRK shipment to Yemen, but interdiction in national sea or air territory is another matter. In fact, many MTCR members already pursue such a policy. In November 1999, for example, British customs seized a cargo of DPRK *Scud* components, bound for Libya, in transit through Gatwick Airport in the United Kingdom.

The members of the PSI are Australia, France, Germany, Italy, Japan, the Netherlands, Poland, Portugal, Spain, the United Kingdom and the United States, all of whom are MTCR members. The PSI is designed to utilise 'inventive use of international laws' to

52. 'Compliance Diplomacy Takes on Greater Emphasis in Arms Control', 31 July 2003; transcript of interview at <http://usinfo.state.gov/usinfo/Archive/2003/Aug/08-871952.html>.

53. Joseph Bermudez, 'Yemen continues ballistic missile procurement programme', *Jane's Intelligence Review*, April 2003, p. 29.

intercept transfers in national air, land, or sea territory. It will work by '[linking] the ability we have to track these shipments with the national authorities that are out there', as a White House official has stated.⁵⁴ It appears that tracking and surveillance capabilities have outrun international export control cooperation, and that some missile transfers have slipped through this gap. For example, the *Scud* shipment seized by British customs in 1999 was not illegal while in international airspace, but once it touched down in the United Kingdom it was subject to the EU arms embargo on Libya and also British commitments under the MTCR. The PSI is designed to facilitate this kind of interdiction, and it should not be doubted that the surveillance capabilities exist to track shipments. In March 2001 US reconnaissance monitored DPRK missile components being loaded onto a plane bound for Iran, and similar assets tracked the Yemen-bound missile shipment last year.

It follows that the more states can be involved with utilising this surveillance information via their national authorities, the fewer opportunities will exist for transfers of missile technology. All EU members belong to the MTCR, due to the transshipment opportunities presented by the single European market. Thus they all possess similar export control laws, and reasonable means to enforce them. If they cannot all be brought into the PSI, it certainly makes sense for the EU to be represented in the Initiative. There are clear indications that the EU is in fact beginning to follow a more robust policy on proliferation. Not long after the PSI was launched, the EU produced a document on 'Basic Principles for an EU Strategy Against Proliferation of WMD', which proposed 'coercive measures under Chapter VII of the UN Charter and international law (sanctions, selective or global, interdictions of shipments and, as appropriate, the use of force)' to prevent proliferation.⁵⁵ This was repeated in a transatlantic context when the EU issued a joint statement with the United States that pledged to 'strengthen identification, control and interdiction of illegal shipments'.⁵⁶

Such a strategy represents one method by which the EU can take direct action against supply lines of missile technology. It is in accordance with MTCR commitments and thus represents a more robust enforcement of existing law rather than a radical departure from the norm. It may also be able to use its economic and political weight to create incentives and sanctions against missile devel-

54. 'Cracking Down on the Terror Arms Trade', *New York Times*, 15 June 2003.

55. 'Basic Principles for an EU Strategy Against Proliferation of Weapons of Mass Destruction', 14 April 2003.

56. Joint Statement by European Council President Konstandinos Simitis, European Commission President Romano Prodi and US President George W. Bush on the Proliferation of Weapons of Mass Destruction, 25 June 2003.

opment. The EU is, for instance, Iran's main trading partner for imports and exports, and is also a partner in the Korean peninsula Energy Development Organisation (KEDO), which substantially increases its influence with two key sources of proliferation concern.

The EU has worked to exploit its status as Iran's most important trading partner, a position that is in large part a consequence of the US embargo on trade with Tehran. The value of this trade is high: in 2001, EU imports from Iran totalled $\pounds 6.7$ billion, with exports to Iran amounting to $\pounds 6.6$ billion.⁵⁷ The European case on Iran has been, firstly, that economic and political engagement can give important leverage over potentially recalcitrant states, and secondly that, in EU Commissioner Chris Patten's words, 'if you don't talk to the reasonable people, you fetch up with fewer reasonable people to talk to'.⁵⁸

This strategy has produced a (very) slowly moving dialogue, including four rounds of negotiations on an EU-Iran Trade and Cooperation Agreement between December 2002 and June 2003. The aim is that the economic investment that Tehran seeks can be developed in tandem with progress on the four key issues of concern to the EU: human rights, terrorism, non-proliferation and the Middle East Peace Process. The 2003 dispute over Iran's potential nuclear ambitions may be a very good indicator of whether this strategy can pay dividends: on 21 July, the EU foreign ministers issued a statement calling on Iran to sign the NPT Additional Protocol (which allows more intrusive international monitoring of nuclear power stations), and stated that they would review future EU-Iranian cooperation in light of the IAEA's report on Iran's nuclear programme.⁵⁹ The United States is likely to play a far more decisive factor in Iran's military posture than the EU, but if the Brussels strategy can be shown to produce results, then it may be that Tehran can be induced to restrain its missile posture as well.

The other sources of potential missile threats to Europe are Libya and Syria, although they represent much more distant possibilities than Iran. Here, the EU has also been working to establish 'critical engagement', this time through the Barcelona Process. Syria is a member, and Libya currently has observer status.

In the case of the DPRK, the EU has held five rounds of political dialogue with this country between 1991 and 2003, and provided over $\pounds 393$ million in aid. It is also, as already mentioned, a partner in KEDO. The opportunities for the sort of policy

57. 'The EU's External Relations With Iran: Overview'; available on EU website at http://europa.eu.int/comm/external_relations/iran/intro.

58. 'The hand of friendship?', *The Economist*, 20 June 2002.

59. Statement by General Affairs and External Relations Council, 21 July 2003; available on EU website at http://europa.eu.int/comm/external_relations/iran/intro/gac.htm.

adopted with Iran are considerably more limited, since the DPRK's Stalinist system means that foreign investment in the country is relatively low. The EU's principal economic link with Pyongyang, therefore, is through aid and KEDO, and it is through these avenues that it may be able to influence the DPRK's policy on missile exports. However, the EU is dwarfed by the United States in Pyongyang's strategic calculus, and it is unlikely that the EU will be able to make serious headway without a rapprochement between the DPRK and the United States. However, if such rapprochement were to emerge, the EU would be in a position to reinforce and enhance any encouraging developments in missile proliferation with its own package of economic incentives, as it has done with KEDO.

Norm-building: what needs to be done?

Norm-building regarding missiles is the most difficult but also the most undeveloped. Norms covering missiles do not exist at the global level, and barely exist at the local one. The HCoC demonstrates how difficult it is to develop missile norms that any state can sign up to: not a single state with significant missile capability outside the MTCR chose to sign (this may be partly due to the HCoC's provenance in the MTCR). EU members played a central role in the drafting of the HCoC and it is quite possible that the initiative might have stalled completely had it not been for the EU's efforts in 2002. As Sidhu and Carle note, 'the crucial challenge for the HCoC is to score demonstrable progress in the implementation of the confidence-building measures it prescribes', and this inevitably means widening the Code's membership to include 'missile-active' states.⁶⁰ The method used in the drafting of the Code may be of use here. The HCoC was drafted among members by a Track II process in the MTCR: the Chair synthesised official papers, a Track II meeting was attended by non-official experts, and the EU organised negotiations held after the HCoC was released from the MTCR drafting process.

60. Op. cit. in note 49.

Conclusions

- ▶ Missile threats from a European perspective are mostly indirect, in the sense that the regional insecurity that is the principle driver of proliferation creates instability in parts of the world where the EU has a strong economic and political interest in stability.
- ▶ Direct threats are theatre level at the moment and thus impact only on EU members directly involved in regional intervention outside the European continent. The only factor likely to change this in the next decade or so would be the extended circulation of *Nodong* and particularly *Taepo Dong* technology. It should be noted here that the *Taepo Dong 1* has only been tested once, in SLV mode when its third stage disintegrated in the upper atmosphere, and the *Taepo Dong 2* has never been tested at all. Both missiles therefore appear to be some way from even emergency deployment, but this does not mean that their export is unlikely in the foreseeable future. The *Nodong* was exported after only one test, and it appears that it was in fact tested under different names in other states. It is therefore quite plausible that the *Taepo Dong* may follow a similar pattern.
- ▶ The EU's biggest influence is economic and political, not military. Fortunately, the tools that this puts at its disposal can have significant impact on proliferation. The key drivers of missile proliferation are the need for hard currency, bilateral hostility and chronic regional insecurity. The EU can help with the first, by developing economic links, and to a more limited extent the third through the political and economic normalisation of relations.
- ▶ The EU can produce results in an MTCR context, but these are less likely in a bilateral context: Chinese and DPRK export control agreements are more likely to result from US pressure.
- ▶ A one-size-fits-all approach is unlikely to be effective in the medium to long term. Export controls hinder development well,



but without norm-building there is nothing to stem demand. This creates incentives for leakage in the export control system. Defences are worth pursuing as a line of last resort: the possibility that missiles will be of little practical use even if export controls are circumvented and norms ignored may be a significant disincentive to developing them, and may well produce a decline in the global market for missile technology.

- More robust enforcement of export controls via interdiction should be pursued by the EU. The PSI is a reinforcement of their existing commitments, not an extension of them, and the high levels of import dependency in missile proliferation render the PSI potentially effective.
- Much of the onus for norm-construction, especially in the context of the HCoC, is likely to fall on the EU for the foreseeable future. This should be pursued, as the HCoC is currently the only demand side missile non-proliferation initiative at the global level.

Europe and nuclear proliferation

Bruno Tertrais

Fighting proliferation
– European perspectives

2

What is nuclear proliferation?

Exactly what is nuclear proliferation? For the purposes of this paper, nuclear proliferation is considered to have occurred when a state embarks on a programme that is liable to result in the manufacture of operational nuclear weapons.¹ The situation where one state acquires weapons made by another is also here considered to be proliferation. Today states are deemed to be ‘proliferant’ if they have a military nuclear programme but are not parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), or are parties to it as non-nuclear states.

From a technical point of view there is no clear distinction between a ‘nuclear’ and a ‘non-nuclear’ state, since there are several stages in the proliferation process: the setting up of installations for producing fissile material; experimental studies with a view to the manufacture of nuclear weapons; the building of a prototype device that is not useable militarily; the development of weapons in the true sense; and so on. A state suspected of having nuclear weapons is not necessarily capable of posing a specific physical threat to an adversary: to do that it needs devices that are weaponised (i.e. can be delivered by an aircraft or missile), reliable and safe (i.e. can be initiated at a precise moment, at a given location and with an appropriate yield). It should be borne in mind that firing a nuclear weapon is a complex business: the weapon must not be too heavy, it must be capable of withstanding high pressure and temperature and it must be programmed to explode at a predetermined moment. It is therefore an option open only to advanced countries.

The modern thermonuclear weapons (H-bombs) held by established nuclear powers are extremely sophisticated devices whose development is beyond the reach of most proliferant countries. On the other hand, constructing a rudimentary fission weapon (A-bomb) with a limited yield poses no particular design or

1. The question of so-called ‘radiological’ weapons is not dealt with here. Such weapons are traditional explosive devices which disseminate nuclear material(s) without either a fission or fusion reaction, and thus without a nuclear explosion. These simple weapons, which can be made using rudimentary means and based on any radioactive material (and can therefore be easily acquired by terrorist groups), have limited physical effects since, above a certain mass, the explosive disperses the matter so widely that the radioactive effect locally is considerably reduced.

development problems. The simplest option in this case is a 'gun-type' weapon, like the bomb dropped on Hiroshima, a simple, reliable weapon that does not require testing (the option chosen by South Africa). The disadvantage is that this type of weapon requires a large mass of fissile material. Another option is the implosion bomb, such as that dropped on Nagasaki, which has become the basic formula for modern fission weapons. As the mechanism involves the compression of a sphere of matter, this type of bomb is more difficult to make and calls for more advanced engineering; it is generally considered that tests are necessary to ensure that the weapon will have the required yield. This is compensated by the fact that such weapons have high yields, and therefore require a smaller quantity of matter (the energy released can be as much as several hundred kilotons).

The most serious obstacle to the manufacture of rudimentary weapons is the acquisition of sufficient fissile material. Here, there are two choices: uranium or plutonium (the latter allowing only implosion bombs to be made). Most proliferant countries have at one time or another opted for plutonium. Some are exploring or have explored both options (Iraq, Pakistan and North Korea, for example).²

- Weapons-grade uranium is obtained through a process in which the mineral is enriched by isotope separation, i.e. by separating out the various types of uranium contained in the material. Through enrichment it is possible to obtain so-called 'highly enriched' material ideally containing over 90 per cent of the isotope U-235. Enrichment can be achieved through various processes, the best and most usual today being centrifugation.³ For a simple weapon with a yield of around 15 kT, about 60 kg of highly enriched uranium is needed if the weapon is the proximity type but only 15 kg if it is an implosion bomb.⁴
- Weapons-grade plutonium (ideally containing over 90 per cent of the isotope Pu-239) is obtained from fuel rods irradiated in nuclear power stations in a separation process carried out in a reprocessing plant. To produce the same yield as the weapon mentioned above, 5-6 kg of plutonium would be required.⁵ Certain types of reactor (light-water) are considered to be less 'proliferant' than others (graphite-gas, heavy-water).⁶ In plutonium technology uranium enrichment is equally necessary, since reactors use enriched uranium as fuel;⁷ but in this case the uranium is only lightly enriched.

2. In the case of technologically advanced countries, the required quantities of matter given in the following two paragraphs can be reduced considerably.

3. Or, more precisely, ultracentrifugation, in the gaseous state.

4. As an indication, it would take several hundred advanced centrifuges working continuously for a number of years to produce a similar quantity by centrifugation.

5. This corresponds to the product of a reactor generating 100 MW over several months.

6. In the 1994 Framework Accord, North Korea gave up in particular the Yongbyon graphite-gas reactor in exchange for two light-water reactors. But it is now acknowledged that plutonium production by this type of reactor is also possible, although difficult. See Victor Gilinsky and Henry Sokolsky, 'N. Korean Reactors Light up Danger Signals', *The Washington Post*, 4 August 2002.

7. This does not apply to heavy-water reactors, which use natural uranium as fuel.

Monitoring of nuclear installations, transfers of sensitive material and fuel (on entry to and exit from the reactor) is therefore potentially a significant barrier to nuclear proliferation. Yet such checks are difficult to carry out by virtue of equipments' possible dual use: nuclear power stations and enrichment plant can be used for either civilian or military purposes. In the absence of perfect international inspection, surveillance of proliferation sometimes has to rely on indicators.⁸

Procuring nuclear weapons produced abroad is the other way that a state can in theory become a de facto nuclear power. (The only recorded case of this type of nuclear proliferation is that of Ukraine, which until 1994 was physically in possession of weapons developed by the Soviet Union.) This is in fact a difficult path to follow: the manufacture of nuclear devices is costly, and countries that have produced them have until now shown little inclination to share this 'wealth'. Moreover, they have generally established sophisticated procedures to guarantee control of these weapons and ensure that if one is stolen it cannot be used.⁹ Lastly, the spread of nuclear technologies is not necessarily in proliferant countries' interest, as they may lose their regional advantage as a result. Nevertheless, this danger has to be taken into account: first, because certain countries in need of funds (North Korea?) could regard the sale of weapons as a lucrative business; second, because even if the central government is not so inclined, some of those in charge of the nuclear programme could be tempted by such transfers for financial or political reasons (Pakistan?); lastly, because the physical measures designed to prevent a stolen weapon from being used are not always very sophisticated (as for instance in the case of certain Russian tactical weapons).

Still, because, as has been seen, the acquisition of weapons-grade fissile material is the main obstacle to proliferation, it is possible to say that acquiring enriched uranium or plutonium abroad constitutes a greater danger than the acquisition of ready-to-use weapons, particularly in view of the huge stock of material accumulated up by the Soviet Union during the Cold War, which is not always kept in conditions of strict security.

In what respects is nuclear proliferation dangerous? This question has exercised experts' minds for several decades. It is reassuring to note that most of the countries that hold or are considering acquiring nuclear weapons view them as a means of deterrence rather than something to be used on the battlefield. It is also

8. These can include, for instance, the size and structure of enrichment plant, the fact that a nuclear power station is or is not connected to the electric power grid, the acquisition of certain equipments and technologies abroad, etc.

9. Ukraine, for instance, apparently did not possess the necessary codes.

generally recognised that possession of nuclear weapons by two adversaries will tend to prevent major conflict between them because of the risk of escalation. Nevertheless, there is a consensus that nuclear proliferation in itself presents many more risks than benefits: the risk of nuclear accidents in countries where security and safety standards are low; the possibility that regional stability will be upset under the umbrella of nuclear weapons; the risk of unauthorised use following the collapse of a country's political and military structures; the risk of nuclear war in an uncontrolled escalation (in particular in the absence of a stable deterrent equilibrium between two adversaries); and finally the risks of 'secondary' proliferation through technology transfer or a domino effect.

This consensus on the dangers posed by nuclear proliferation is symbolised by the 1968 Treaty on the Non-Proliferation of Nuclear Weapons (NPT). This accord, which is based on recognition of the advantages, for both nuclear and non-nuclear countries, of limiting proliferation, is the cornerstone of the nuclear non-proliferation regime. It is complemented by the UN's International Atomic Energy Agency (IAEA), which carries out checks on the activities of nuclear installations.

A resurgence of nuclear proliferation

An accumulation of bad news

Following the signing of the NPT, the momentum of nuclear proliferation seemed to have been contained. At the end of the last century it had become one of the most universal of instruments and, prior to the withdrawal of North Korea, included 188 of the 191 UN member states. Its indefinite extension in 1995 had been seen as establishing non-proliferation as the norm. At the same time, the IAEA's control regime had been enhanced, with the addition of new protocols introducing in particular strengthened safeguards (which widened the range of inspections) and new non-proliferation norms drawn up (in the Comprehensive Test Ban Treaty – CTBT¹⁰).

Developments since summer 2002 have, however, shown just how fragile the edifice built up over nearly forty years is. For a while overshadowed by the Iraq crisis, they seem to have ushered in nothing less than the beginnings of a new wave of nuclear proliferation that could be difficult to stem.

10. The CTBT, which is not yet in force since China and the United States have not yet ratified it, basically limits 'vertical' proliferation: it does not stop countries from acquiring nuclear weapons but prevents them from developing sophisticated weapons, especially thermonuclear, on their own initiative.

In October 2002 North Korea admitted that it had been secretly pursuing its nuclear programme, despite the undertakings it had made in 1994 in exchange for the supply of two electric power stations, thereby confirming suspicions harboured by the American intelligence community for several months. Behind its apparent abandonment of plutonium, Pyongyang had in the period 1997-98 begun a *second* nuclear programme based on enriched uranium. In parallel with the Iraq crisis, which Pyongyang was following closely, North Korea continued to move forward along its chosen path, expelling the IAEA's weapons inspectors in December, dismantling the video cameras installed on its sites (and therefore leaving some 8,000 irradiated fuel rods without surveillance), announcing its withdrawal from the NPT in January 2003¹¹ and restarting its Yongbyon 5 MW reactor at the end of February that year. With the Iraq crisis over, Pyongyang has continued to blow hot and cold, accepting to hold multilateral discussions under the aegis of Beijing while at the same time sending increasingly clear signals about its 'deterrent capability'.

Is the nuclear card that North Korea has laid on the table the last one held by a hard-pressed regime? Perhaps, but analysts and political leaders have been betting on the collapse of the last Stalinist regime on the planet for more than ten years now. (Moreover, it was on that assumption that some of its authors drew up the 1994 agreement.) Whatever the exact state of North Korea's arsenal, it is reasonable to assume that we will now have to reckon on the existence of one extra nuclear power.

The surprise sprung by North Korea had scarcely registered when the American press revealed what the intelligence services had known for some time: in exchange for a transfer of ballistic missiles, North Korea had obtained centrifuges for its uranium enrichment programme from Pakistan. This news was very embarrassing for Islamabad and Washington, Pakistan being an important ally of the United States in the war on terror.

Finally, more revelations emerged on the state of Iran's nuclear programme. Iran was developing a programme on a scale that was scarcely compatible with its energy requirements alone, and was laying down conditions for subscribing to the IAEA's 'strengthened guarantees protocol'. The year 2002 saw confirmation from various sources of the existence of nuclear installations at Arak (producing heavy water), Isfahan (uranium hexafluoride) and Natanz (uranium enrichment). Moreover, as is known, a 1,000

11. The IAEA considers that the accord on safeguards is still applicable.

MW (Busher-1) light-water reactor, built with Russian assistance, is to be completed in 2005, followed by other similar projects. At the beginning of 2003, doubtless noting Russia's decision to return to Russia the fuel produced in future by the Busher reactor to avoid any risk of proliferation, Iranian President Muhammad Khatami announced Iran's intention to master all phases of the fuel cycle. Tehran indicated that in that regard Iran had begun to extract minerals from deposits in Yazd province, discovered in 1996, and intended to start up the Ispahan facility rapidly. The country has at its disposal everything necessary to produce an operational nuclear weapon in a few years if it wishes: uranium, reactors, processing facilities and ballistic missiles (the *Shahab* series under development). The IAEA has only been able to visit a portion of the new installations, and Iran is suspected of having conducted experiments on enrichment without informing the Agency (traces of enriched uranium have been found in the installations visited). There were therefore very sound reasons for believing that Iran was developing a programme that could have military applications. That at least is what members of the IAEA seemed to think who in September 2003 called upon Tehran to explain itself, whereupon Iran issued a declaration (described by the country's leaders as 'complete and exact') of its nuclear activities on 23 October. However, the satisfaction expressed by the Agency and the Europeans following that declaration left Washington unconvinced.

A simultaneous increase in both supply and demand

The new dynamic of nuclear proliferation has resulted from a simultaneous increase in the factors likely to fuel both the 'supply' side of proliferation and the 'demand' side.

On the supply side, the demise of the state's absolute authority in Russia and China is a first factor. Proliferation can now involve private bodies or autonomous state entities whose behaviour is unknown to, or not sanctioned by, central government (even if things seem to be improving in both countries). A second element is the appearance of nuclear actors ready to help others because of their shared interests, that is, what one might term a 'proliferants club'.¹² Pakistan and North Korea today constitute an essential element of this. For twenty years Pakistan's nuclear expertise has been offered to North Korea, Iraq, Iran and apparently other countries in the Middle East. The worry is that in future North Korea

12. This phenomenon has previously been encountered in the field of ballistic missiles: a typical example at the end of the 1980s was the *Condor* project, which involved Argentina, Egypt and Iraq.

will in the nuclear domain become what it is today in the field of missiles: the main supplier of 'ready-to-use' technology. Cooperation between proliferant countries in the nuclear field is nothing new: one has only to recall the partnerships between, for instance, France and Israel, Israel and South Africa, or China and Pakistan. What is new is that this club is today composed of countries that have strained relations with the West. A third and final factor is the growing energy requirements in Asian countries and the lack of fresh water in the countries of the Middle East. These needs are likely to favour the development of civil nuclear programmes, and therefore nuclear expertise, in many countries.¹³

Yet it is on the demand side that developments have been most significant. Paradoxically, American policy, which is largely focused on the need to fight the threat of nuclear weapons, unfortunately seems likely to promote their proliferation.

First, one has to bear in mind that those responsible for such questions in the Bush administration (such as John Bolton at the State Department and Robert Joseph at the White House) do not hold the NPT in high regard, and that even before 11 September were noticeably distancing themselves from undertakings made regarding the Treaty and its Review Conferences.

Next, it has to be recognised that the United States's withdrawal from the ABM Treaty now gives a powerful argument to those wishing to develop a nuclear programme openly. It is of course not in itself a proliferating factor, but how in future will it be possible to respond convincingly to a country citing its 'supreme national interest' as justification for withdrawal from the NPT?

Moreover, as part of the war against terrorism, which has been declared a priority with good reason, Washington has lifted sanctions imposed on India and Pakistan, avoided any negative action against Pakistan following the revelations of autumn 2002 and even considered resuming the sale of fighter aircraft to that country. Russia and China can bank on the fact that Washington needs them, and could therefore raise the stakes to satisfy US demands concerning controls on exports of nuclear technology; also, the lifting of sanctions is bound to encourage Moscow to intensify its cooperation with New Delhi on nuclear issues.

More generally, regional actors are viewing with concern America's increasingly offensive strategy, which is based on modernised conventional and nuclear capabilities. Following the 1991 Gulf

13. The possible use of nuclear reactors in the desalination of seawater is considered promising.

war the idea spread, from Libya to India, that one cannot fight the United States if one does not have nuclear weapons. There is every chance that, given the policies of Mr Bush's America, regimes that rightly or wrongly oppose the superpower will increasingly see nuclear weapons as the ultimate guarantee of survival.

- North Korea accordingly claims that its nuclear programme is justified by the policy of Mr Bush, who put an end to all negotiations with Pyongyang from the moment he took office. Should that argument really be dismissed out of hand? After all, even paranoid leaders can have enemies: the inclusion of North Korea in the 'axis of evil' in 2002 by President Bush, who avows that he 'loathes' Kim Jong Il, was bound to stiffen North Korea's resolve.¹⁴ It is too easy to see North Korea's programme as nothing more than a means of blackmailing or a bargaining chip. Pyongyang's reasoning seems to be something like this: either the United States and South Korea accept the country's existence, in which case its programme will in theory no longer have a *raison d'être*, or those countries do not play the game, and building up a nuclear arsenal will then be a logical step.
- Iran is also witnessing a redeployment of American military might in its neighbourhood, and has as a result probably decided to step up its programme. Iran's interest in a military nuclear capability dates back to the time of the Shah, and was relaunched following the war with Iraq. At present there appear to be several factors underlying Iran's programme: Iran considers itself to be isolated, surrounded by nuclear countries (India, Israel, Pakistan and Russia), and above all sees American forces being deployed all around its territory. Its programme therefore seems to follow a defensive logic of deterrence, but it is probable that playing the nuclear card is also seen as a way of confirming its status as a regional power. One cannot state categorically that Tehran has already decided to acquire the bomb at all costs. On the other hand Iran's programme has disturbing similarities with that of France in the mid-1950s: if that is indeed the case, it is possible that nuclear weapons are being seriously considered, but the decision to build up an arsenal of operational nuclear weapons has probably not yet been taken.
- Even Brazil, despite the fact that after the signing of the Treaty of Tlatelolco (on the prohibition of nuclear weapons in Latin America) it became one of the champions of disarmament, has given signs of renewed interest in nuclear weapons. During the

14. This is not, of course, to lay the blame for all the world's ills on the Bush administration; it should be remembered that the uranium enrichment programme was doubtless launched around 1998, even while the Korean peninsula Energy Development Organisation (KEDO) accords were being implemented.

presidential election campaign, Mr Lula da Silva strongly criticised continued discrimination against non-nuclear countries in an NPT context. In January 2003 the new minister for science and technology hinted that Brasilia could not rule out the acquisition of certain instruments of power, including nuclear weapons.¹⁵ The political stance of the team in power today, which is in favour of distancing itself from Washington and fighting American 'hegemony', reflects that reasoning. Not that Brazil is on the point of restarting its nuclear programme, but this sort of rhetoric is bound to weaken the 'delegitimation' of nuclear weapons, and seems to be representative of a way of thinking that is today current among so-called 'developing' countries.

Lastly, the war in Iraq could have a double effect: first, as suggested earlier, it could strengthen the hand of those in favour of launching or speeding up nuclear programmes in their country on the grounds that only nuclear weapons can give protection against American conventional might; and above all it could encourage a country on the nuclear threshold to go beyond it and withdraw from the NPT. Indeed, if one compares America's attitudes towards North Korea and towards Iraq, the question 'would it be better to cheat or to withdraw?' now seems likely to receive an unambiguous reply.

Where is nuclear proliferation heading?

The events described above hold many lessons concerning the future of nuclear proliferation. First, they suggest that proliferation is no longer a phenomenon that results essentially from regional dynamics. The direction it takes will now largely be a consequence of an affirmation of American political and military power that is perceived as hypertrophied and hyperactive. To use a fashionable expression, it has become a 'glocal' (i.e. both global and local) phenomenon.

The events of the period 2002-03 confirm, moreover, that in this field pessimistic analyses are frequently borne out by the facts. Over a period of several years the director of the CIA in his public declarations mentioned the strong possibility that North Korea was pursuing a nuclear programme, reckoning that it probably had enough plutonium to make one or two bombs. His warnings were an embarrassment to the Clinton administration and America's Asian allies (and were viewed with circumspection, even

15. See Larry Rohter, 'Brazil Needs A-Bomb Ability, Aide Says, Setting Off Furor', *New York Times*, 8 January 2003.

incredulity, on this side of the Atlantic). Recent events unfortunately tend to show that he was right. It is not unreasonable for the Americans, in their analyses, to put the emphasis on capabilities rather more than on intentions: whereas it takes at least ten years to develop a nuclear programme, it takes only ten minutes to decide on a change in policy. Moreover, analyses by American intelligence services are sometimes even too optimistic. For example, the United States underestimated the progress made in Iraq's programme at the end of the 1980s, as well as India's determination to carry out a series of nuclear tests at the end of the 1990s. (The continuing controversy over the presence or not of weapons of mass destruction in Iraq does not invalidate that view, quite the contrary: it is striking just how conservative the leading intelligence agencies were in their estimates of the actual threat posed by Iraq's nuclear programme.¹⁶)

For the international community North Korea is a cause of more immediate concern. Its programme demonstrates both the determination of certain proliferant countries and their ability to conceal what they are doing. Korea's cooperation with Pakistan is an example of what was referred to earlier as the 'proliferants club'. The situation in the region is still very tense, and the possibility of a military escalation, deliberate or resulting from a knock-on effect, cannot be ruled out. The breach opened in the NPT could encourage other countries to follow suit. And North Korea, which has shown its willingness to sell to anyone seeking its military technology, could in a worst-case scenario become a veritable supplier of nuclear services to any interested state or terrorist group.

We are probably at a critical juncture in the history of nuclear proliferation, something not dissimilar to the situation at the beginning of the 1960s. Granted, there are fewer countries likely to have the capability and determination to develop nuclear weapons than at that time, but their motivations are stronger. One therefore has to be prepared for a possible new wave of proliferation. The tests carried out in 1998 signalled the end rather than the beginning of a cycle: the two states concerned had begun their nuclear programmes a long time previously (the 1970s), had never been parties to the NPT and had already begun to experiment with military uses of nuclear energy. The phase now beginning is set in a different context – that of an almost universal NPT and an emerging international norm banning tests.¹⁷ Proliferant states will therefore in future be either those with disguised, illegal pro-

16. The technical analysis of Iraq's nuclear capabilities carried out by the American intelligence community in 2002 was not fundamentally different from those of America's allies and the IAEA. It emphasised certain grey areas, citing Baghdad's acquisition of aluminium tubes without claiming that this was irrefutable proof, and suggested that Iraq would need several years more to amass sufficient weapons-grade fissile material to make a nuclear weapon. See Central Intelligence Agency, *Iraq's Weapons of Mass Destruction Programs*, October 2002. Furthermore, after verification the CIA did not consider allegations of uranium imports from Niger to be serious.

17. Following the accession of Cuba in 2002, the only members of the UN not parties to the Treaty were India, Israel and Pakistan.

grammes or parties that have withdrawn from the NPT, and those in the former category could become part of the latter.

The first wave of proliferation can be said to have begun in the 1940s, with the acquisition of a nuclear capability by the so-called 'P-5' countries (the Soviet Union, the United Kingdom, France and China, in addition to the United States). The second, including non-signatories of the Treaty (South Africa, Argentina, Brazil, South Korea, India, Israel, Sweden and Taiwan) occurred in the 1960s and 1970s. The positive security guarantees given by the United States, either implicitly (in the case of Sweden and Taiwan) or explicitly (South Korea) and regional political developments (in Latin America and southern Africa) limited its effect: the only programmes to survive were those forming part of what was a complex and highly nuclearised geostrategic framework.

What countries might figure in a third wave of nuclear proliferation? Given the history of proliferation, which gives fifteen or so examples of more or less advanced programmes, one can conclude that a certain number of conditions underlie nuclear weapons programmes: a serious perceived threat to a country's security, the absence of credible security guarantees, the need to assert national identity and the availability of technological know-how. Using those criteria, one can draw up a list, in addition to those mentioned earlier (North Korea and Iran) of potential candidate countries.

- Japan, South Korea and Taiwan are showing signs of growing concern at the problem of North Korea and the development of China's nuclear arsenal. For these countries, which already have a significant civilian nuclear capacity, crossing the nuclear threshold could be a real possibility if they ever came to doubt the nuclear protection provided by the United States. Moreover, if one of the three acquired the bomb the other two would be all the more tempted to follow suit.
- Libya and Syria might be tempted to acquire a military nuclear capability if, isolated, they perceived growing American hostility towards them.
- Algeria and Egypt might well once more be tempted as in the past if the non-proliferation regime were to become weaker.
- If it appeared that the United States was possibly going to abandon it, Saudi Arabia would not want to see its rival Iran acquiring nuclear weapons without reacting in one way or another. The traditionally close links between Riyadh and Pak-

istan could then lead to the particularly unpleasant possibility that the hitherto fantastical notion of an 'Islamic bomb' could become a reality.

- ▶ Lastly, if Iran were to become a nuclear power this could also cause Turkey, if its security links with the United States were to become looser, to reconsider its strategic options.

Such countries could develop nuclear weapons programmes on the basis of existing installations (see, as an example, the list of nuclear research reactors in the Middle East given below) but also in certain cases buy weapons directly. Moreover, for some of those thought to have been tempted by nuclear weapons in the past, acquiring a capability could be made easier by the fact that the scientific and technological expertise gained in the 1970s and 1980s has not disappeared.

A certain number of critical variables will determine the form that this new wave of proliferation assumes. Will a second signatory withdraw from the NPT in the foreseeable future, with the risk that this sets off a veritable unravelling of the regime? Does Islamabad have the means and the desire to control much more closely the activities of Pakistan's nuclear community? What conclusions will proliferant countries draw from the war in Iraq? Will the North Korean nuclear crisis be resolved by negotiation, force, or not at all?

Nuclear research reactors in the Middle East¹⁸

Country	Name	Type	Power	Foreign contributions	In-service date	Status
Algeria	Nur	Light-water	1 MW	Argentina	1989	Operational
Algeria	Es-Salam	Heavy-water	15 MW	China	1992	Operational
Egypt	ETRR-1	Light-water	2 MW	USSR	1961	Operational
Egypt	ETRR-2	Light-water	22 MW	Argentina/Russia	1997	Operational
Jordan	LPNRR		30 MW			Planned
Libya	IRT-1	Light-water	10 MW	USSR	1981	Operational
Morocco	MA-R1	Light-water	2 MW			Under construction
Syria	SRR-1	Light-water	30 MW	China	1996	Operational
Tunisia	TRR-2	Light-water	2 MW			Planned
Turkey	ITU-TRR	Light-water	0.25 MW	United States	1979	Operational
Turkey	TR-1	Light-water	1 MW	United States	1962	Out of service
Turkey	TR-2	Light-water	5 MW	United States	1981	Out of service

18. Source: IAEA. Iraq, Iran and Israel are not shown in the table.

In what ways is Europe affected by nuclear proliferation?

For Europe, renewed nuclear proliferation does not necessarily imply an *immediate* threat. When it comes to capabilities, no regional actor having a nuclear programme (except Israel) is yet capable, at least as far as known capabilities are concerned, of posing a ballistic missile threat to European Union member states.¹⁹ When it comes to intentions, no country in the region is known to want to attack Europe as such. Moreover, states acquiring a nuclear capability also employ a more or less explicit language of deterrence: there is seemingly general agreement today that nuclear weapons are for defence.

Current and foreseeable moves on the nuclear proliferation front are nevertheless in many respects a source of concern for Europe. Many European interests are involved, and there is a certain correlation between the zones in question and the type of interest at stake.

- In Asia, the risks are essentially to do with what can be termed global stability, with non-proliferation regimes and norms being called into question. But a major conflict in Asia over nuclear issues or involving the use of nuclear weapons could also have serious indirect (political, economic and financial) consequences for Europe.
- It is in the Middle East that Europe's more immediate interests could be affected: economic security (proliferation being likely to concern zones that are sources of supply of hydrocarbon fuels), defence agreements between certain members of the Union and Gulf states, and European involvement in the Middle East conflict.²⁰
- In North Africa, a renewal of nuclear programmes would naturally affect Europe's efforts, particularly through the Barcelona process, to develop good relations. In particular, there would necessarily be a perception among political parties of a potential threat, given the area's geographical proximity. If Egypt, Libya or Algeria were one day to acquire nuclear weapons, the question would be seriously debated not only in neighbouring Mediterranean countries (Cyprus, France, Greece, Italy, Malta, Portugal and Spain) but in the Union as a whole.

That said, as suggested above this correlation between interests at stake and the location of threats is very approximate. First, the

19. Nevertheless, Sicily is within range of Libya's *Scud* missiles, and possibly part of Greece could be reached by Iran's *Shahab 3*.

20. In this respect the question of Israel's nuclear weapons is considered by certain countries in the region to be an obstacle to lasting peace.

European Union intends to become a fully-fledged global actor, and is therefore developing political and economic links to all major regions in the world. It is not impossible that in the next ten to fifteen years the Union will have to conduct major military operations at a considerable distance from Europe: what then if its forces find themselves exposed to a nuclear threat in an area not covered by the Washington Treaty? Next, the increase in the range of missiles developed or obtained by several proliferant countries will bring the territory of the Union within range of a larger number of them; transfers of technology from distant countries can affect our immediate interests. Lastly, some European countries have security arrangements with faraway countries.

North Korea, a country geographically very far from the Union, is a good example in these respects. Europe is concerned by the North Korean nuclear crisis for five reasons at least: the importance of the North Korean case for the non-proliferation regime (which was moreover one reason for the Union's involvement in KEDO²¹); the danger of the transfer of North Korean nuclear expertise and technology to countries geographically close to Europe that have in the past shown an interest in nuclear matters; the involvement of some member states in maintaining security in the peninsula, through the Military Armistice Commission (France, the United Kingdom), the Committee supervising the Commission (Sweden) and the 1953 declaration that guarantees South Korea's security (Belgium, France, Greece, Luxembourg, the Netherlands and the United Kingdom); the risk, in the event of a serious crisis in the peninsula, that North Korea could be tempted to blackmail the United States's European allies;²² finally, the dramatic effects that another Korean war would have on the world's economy, and therefore that of Europe.

The European Union has still other reasons to be more preoccupied by the nuclear threat. Whereas the immediate nuclear threat to Europe disappeared at the beginning of the 1990s, a consequence of enlargement has been to bring nuclear problems nearer to Europe. Its enlargement to the north and east gives the Union a shared border with the country that has the largest nuclear arsenal in the world. In a situation where Iran (or even Syria) had nuclear weapons, the integration of Turkey would establish a new 'nuclear frontier' for Europe. Lastly, the emerging 'strategic disconnect' between the two sides of the Atlantic raises the spectre of Europe and the United States following different

21. Korean peninsula Energy Development Organisation, a consortium set up in 1994 to implement the North Korean denuclearisation agreement, which the Union helps to finance. The Union is also one of the main donors of humanitarian aid to North Korea.

22. If North Korea continues to increase the range of its missiles, European territory will in theory be vulnerable to such a threat before that of America.

paths in the fight against proliferation, and of America's protection of the Old Continent perhaps not being quite so assured (or at least perceived as such) in ten or fifteen years' time.

For all of these reasons Europe must become a central player in the debate on nuclear proliferation and non-proliferation.

What options are open to the European Union?

The ministerial meeting in Luxembourg and the Thessaloniki European Council (both in June 2003) formed an important stage in Europe's formal recognition of the dangers of nuclear proliferation. The Union must now implement the strategy and plan of action adopted then and go even further.

Courses of action

Awareness of the problem

While opinion polls show that people in the West are aware of the nuclear risks, proliferation has for long figured way down on the European Council and Commission's leaders' list of concerns, except on occasions like the NPT Review Conferences, which resulted in the Union's Joint Action of 1995 and the Common Position of 2000.²³ Military nuclear expertise exists in Europe among the nuclear powers, in EURATOM and to a certain extent in the form of know-how amassed by European countries that have in the past been tempted to start nuclear programmes. This expertise should be incorporated and distributed within the Brussels machinery to greater advantage. It must be augmented by bigger contributions from member countries' intelligence services to Brussels.²⁴ Participation in groups dealing with proliferation (CONOP, CODUN) must be at a high level, and greater account of the work of these groups should be taken by the Union's political bodies. It is equally important, from the point of view of public opinion, that the importance of the risks of nuclear proliferation should be stressed in a more formal and regular manner in the Union's declarations and communiqués. It would in this respect be unfortunate if the controversy over the real state of Iraq's WMD programme were to create a belief among the European public that the emphasis on the dangers of proliferation had been an American plot.

23. Other notable examples include Europe's participation in KEDO (Joint Action, 1995), transparency on export controls in the nuclear field (Joint Action, 1997), and nuclear and ballistic non-proliferation in South Asia (Common Position, 1998). For an historical overview and an account of the Union's policy in this field, see Camille Grand, 'The European Union and the non-proliferation of nuclear weapons', *Chaillot Paper* 37 (Paris: Institute for Security Studies of WEU, January 2000).

24. This includes satellite imagery, which can, for instance, provide interesting data from surveillance of nuclear experimentation sites.

Realism

While remaining faithful to its principles, Europe must be realistic and not delude itself as to which options are realistic.

Lecturing India and Pakistan on the urgent need to join the NPT is probably not the best way to play a useful role in dealing with nuclear risks in Asia, and could even be counter-productive. It is conceivable that Europe, as a matter of principle, would make such a request, but that should be merely a reminder.

The idea of a nuclear weapons-free zone in the Middle East has no chance of succeeding in the short and medium term. The problem of defining such a zone seems impossible at present. Incidentally, it is difficult to admit the argument that Israel's nuclear capability presents an obstacle to lasting peace in the region put forward by countries that have not even acknowledged Israel's right to exist.²⁵ (It could on the contrary be maintained that, as this potential constitutes a life insurance policy for that country, it is for the moment necessary for the continuance of the peace process.²⁶)

Denuclearisation is not necessarily the corollary of democratisation. Those who have a tendency to associate democratisation and non-proliferation would do well to bear in mind that of the eight countries recognised as having nuclear weapons, six or seven can be considered to be democracies. To wager that an Iran no longer in the grip of the mullahs would necessarily be a non-nuclear country would be to run the risk of a big disappointment. And even if Iraq were to become a stable, peaceful democracy, only a solid American security guarantee would ensure that this country, given its geostrategic situation, would give up its nuclear ambitions once and for all. Democratisation can have an impact on the way a programme is handled (states based on the rule of law being less inclined to cheat than the others) but not on the decision to launch such a programme. In general, domestic and regional political developments are not the only key to non-proliferation. If the settlement of regional disputes is often necessary for the reduction of proliferation, it is rarely sufficient. Countries that have become denuclearised even though they have no security guarantee have only done so because of a simultaneous transformation of internal and external political balances and their isolation from major geostrategic developments (countries such as Argentina, Brazil and South Africa); it should also be recalled that there has been only one known instance of a country giving up nuclear weapons that it had developed on its own (South Africa).

25. Nor must Europe accept the logic that chemical weapons in the region would act as a necessary counterbalance to Israel's nuclear potential and make a country's membership of the CWC and BWC dependent upon another country joining the NPT: the 'double standards' argument would only apply if membership of one treaty (whether it is the CWC, the BWC or the NPT) is required of one country and not another.

26. The idea of a 'WMD-free zone' (a concept that has still not been put into practice) in theory makes it possible to avoid the trap of 'double standards'. It is, however, still more unrealistic than the former, and in addition the Arab countries know that this option would not be to their advantage, as Israel would still be the leading conventional military power in the region.

The slowness of the nuclear disarmament process is not a primary factor in the present state of developments in nuclear proliferation. Of course, here again American policy can, whether one likes it or not, tend to encourage proliferation. The timetable for implementing the Nuclear Posture Review lists measures to be taken up to 2040 – clearly indicating that the present Administration intends to keep nuclear weapons for several more decades, which is somewhat at odds with the way many states interpret Article VI of the NPT. Yet there is no reason to suppose that accelerating nuclear disarmament would have any significant effect on nuclear proliferation. Nothing so far indicates that the American decision not to rule out development of new, low-yield nuclear weapons, as part of a doctrine of deterrence, would amount to infringement of non-proliferation regimes or would be likely to encourage countries that have not yet done so to acquire nuclear weapons.²⁷

Coordination

Coordination of European policies on non-proliferation is a determining factor for the coherence and effectiveness of choices made by the Union.

Like charity, coordination must begin at home. Coordination among European countries, and between the Union's various mechanisms, is still not totally assured when it comes to diplomatic initiatives in South Asia, aid to the former Soviet Union, etc. North Korea and Iran are particularly revealing examples. Recognition of the North Korean regime happened in a totally haphazard way, and two countries in the Union have preferred not to establish diplomatic relations with Pyongyang. And the Union's discussions with Iran have for too long been conducted via two different channels, one in the Community (for trade and aid) and the other within the CFSP (covering proliferation issues), with few links between the two.

Coordination must also be optimised among countries in the West, for several reasons: first because European and American priorities are not basically different; next because, far from being 'irrational', proliferant countries demonstrate a remarkable mastery of diplomacy and know to play on any divisions in the West; and lastly because it is possible in certain cases to have a useful division of labour with the United States. For example, it was not inopportune that the Union struck up a dialogue with Pyongyang,

27. That does not exclude the possibility that such decisions could have politically undesirable effects. Many feel (wrongly) that the United States sees these arms being used rather than acting as a deterrent: that perception could strengthen the feeling that one has to guard against an 'American threat'.

at Sweden's initiative, at the beginning of 2001 when the Bush administration had closed its channels of communication with North Korea. But such steps have to be taken in full coordination with the United States and bearing in mind that Europe (the Union and individual member countries) has almost as many options for fighting proliferation as the United States.²⁸

A few suggestions on substance

Courses of action for the European Union

- ▶ **Put conditionality at the heart of EU policy.** Conditionality vis-à-vis non-proliferation undertakings already exists largely on paper, and has sometimes been applied in practice,²⁹ but it now deserves to be brought to centre stage.³⁰ The need to respect international non-proliferation norms is often included as merely a token reminder in exchanges between the Union and its partners. It is now desirable for it to be put at the heart of relationships that the Union is developing with both exporting countries (Russia, China, Pakistan, North Korea, etc.) and recipients (Iran, Libya, Pakistan, etc.). It must also be widened to include new instruments such as the IAEA's additional protocols (or indeed the CTBT), and to proliferant activities that escape international controls (for example exports from North Korea, which is no longer a signatory of the NPT). It must become a sine qua non of access to European aid and markets – a step that the Union has not so far wished to take.³¹ It is not a matter of rewarding renunciation of nuclear programmes (which would amount to blackmail) but of making it a necessary condition of normalisation of political, economic and military relations.³²
- ▶ **Become the leading body promoting international legal norms on non-proliferation.** The EU's recognition of the primacy of international law is one of its 'trademarks'. The present system formed by the NPT and IAEA, despite their imperfections, is one of the widest in scope and remains the only possible cornerstone of the international nuclear order. Promoting international non-proliferation norms is a first way in which the Union could act. This implies, first, differentiated treatment, in terms of political and trade relations, between countries that are not signatories to the NPT (like India) and those who appear to have chosen to violate it (like Iran). Next, when the behaviour of non-signatories is unacceptable (Pakistan or

28. The only options not open to Europe at present are, on the one hand, what the United States calls 'dissuasion' and consists in maintaining a considerable military potential, for example in the nuclear field or in anti-missile defence, to discourage countries from starting up nuclear or ballistic programmes; and on the other, the threat of destruction of nuclear potential by force (even though this is more through lack of know-how and adequate operational planning than lack of military means).

29. For instance implementation of the cooperation agreement with Ukraine, which only happened after Kyiv had become a signatory of the NPT.

30. The EU Strategy against Proliferation of WMD of June 2003 incorporates this idea.

31. The European Council's declaration at Thessaloniki in June 2003 states simply that 'development assistance . . . should take account of WMD proliferation concerns'.

32. The last point must be qualified: as explained below, a consequence of the ban on the sale of conventional military equipments can be that a state stiffens its resolve to acquire a nuclear programme.

North Korea), the Union should help draw up new legal norms, for example within the UN, to prevent nuclear transfers. In addition, Europe could take advantage of the United States's passivity in traditional multinational non-proliferation forums to make proposals in those bodies. Lastly, Europe must help to strengthen the IAEA's technical, financial and human resources.

- Only impose sanctions sparingly and discriminately.** It must be recognised that sanctions are a two-edged weapon, to be used with great care. In addition to the risk of a dangerous acceleration of the proliferation process that could result from the application of too great pressure on a country, the example of Pakistan shows that a ban on the sale of conventional equipment on the pretext that a country has a military nuclear programme can, if it considers itself to be facing a serious threat to its security, push it towards even greater dependence on nuclear weapons and therefore step up its programme.³³ In light of the present risks, however, the question of sanctions must be considered in the case of non-signatories to the NPT who deliberately export nuclear technology.³⁴
- Better coordinate and increase EU efforts to fight proliferation 'at source'.** It is essential to work towards limiting proliferation at source. This means, as a priority, strengthening the means used to bar access to countries or groups interested in the huge reservoir of weapons, know-how and technology that Russia still holds. For too long Europeans have been in the habit of looking on military nuclear security as a matter for the United States alone. Admittedly, aid to countries of the former Soviet Union is the subject of an EU Joint Action, which was renewed in 2003, and significant efforts have been made by individual countries, in particular concerning measures to make weapons secure, nuclear safety, the protection of nuclear material and its possible conversion.³⁵ Yet European contributions are still disparate, badly coordinated and inadequate, given what is at stake. It would therefore be useful to coordinate all national initiatives better, under the aegis of the Union, and as from 2006 consider a significant increase in joint aid, in accordance with the degree of political and strategic importance that this question has for Europeans.³⁶ Further, the Union could take advantage of the fact that so-called 'theatre weapons' (which are of concern in particular to countries join-

33. The ban by the US Congress on the sale of American weapons to Pakistan because of its nuclear programme seems in the 1990s to have had the pernicious effect of making it step up its programme.

34. The question of sanctions also arises in the ballistic field, in that nothing prevents a country that is not an MTCR signatory from exporting long-range missiles to a country bordering on Europe that is developing a nuclear capability, giving it the ability to strike European territory.

35. On current measures in the EU, see Burkard Schmitt (ed.), 'EU cooperative threat reduction activities in Russia', *Chaillot Paper* 61 (Paris: EU Institute for Security Studies, June 2003).

36. An increase is in fact envisaged in the Union's Strategy against Proliferation of WMD of June 2003.

ing the EU in May this year) are not covered by binding disarmament accords: Russia claims the destruction of theatre weapons is in arrears because of the priority given to strategic weapons (which has been financed partially through American programmes); one might take Russia at its word and finance an increase in Russia's dismantlement facilities. And actions taken must not be limited to Russia: Europe can play its part in making secure the material contained in the tens of research reactors in the world (in all, some 20 tons of HEU in nearly 40 countries). It could also, where appropriate, contribute its own unique experience of intraregional control gained through EURATOM. Finally, European policy on North Korea should also form part of this effort at containment of nuclear proliferation (in order to prevent Pyongyang transferring material or weapons to countries in North Africa). In this regard the participation of European countries in America's examination of new ways to control transfers is useful and necessary. Yet one must not forget Pakistan, towards which the US attitude is sometimes ambiguous, its support being so necessary in the fight against terrorism.

- **Continue to treat Iran as priority number one.** There are three important points about Iran: it is very near Europe; its programme is only in its initial stages and there is still time to halt it before operational nuclear weapons are produced; and the Union has effective means to use in its dealings with this country. Moreover, this is a critical test case for the future of nuclear proliferation. For all of these reasons Iran must remain the Union's first priority. It is not a matter of rewarding Iran for freezing its programme but of letting Tehran know that the normalisation of diplomatic and trading relations with it will depend on its total, verifiable relinquishment of any illegal nuclear activities (which supposes *unconditional* adherence to the IAEA additional protocol). Because of the international situation the Union made a first strong statement on Iran at its ministerial meeting in Luxembourg in June 2003, which was a welcome move. The accord reached by the European troika at the end of October should be seen as a point of departure and not a task completed. This question must continue to appear at the top of European countries' agendas, because it would be very surprising if Iran had renounced the nuclear option once and for all.

- Be prepared to use force in certain cases.** Member countries of the Union may be called upon to use armed force when participating in a coalition with the United States, as some of them did in 1991, 1998 and 2003 against Iraq. But joint European action in such a case would also be possible even when there is no agreement on the legal situation,³⁷ although it is hard to imagine, in the foreseeable future, a strictly European military operation with the primary aim of eliminating a nuclear programme. Nevertheless, it is possible that during the course of a crisis management operation European forces could find themselves exposed to quasi-nuclear threats or blackmail (for example by a paramilitary group that had obtained a stock of fissile material³⁸). In such a case, the Europeans might have to conduct operations to reduce the threat using air forces or special forces.

Courses of action for France and the United Kingdom

In order to contribute to Europe's political credibility in the field of nuclear non-proliferation and avoid their status presenting an obstacle to the Union's common actions, France and the United Kingdom must continue to behave as exemplary nuclear powers, as they have done to a large extent since the end of the Cold War (notably through their unilateral disarmament initiatives and their support for new measures such as the CTBT and FMCT). Security, nuclear safety, transparency and continuing observance of the concept of 'sufficiency' or 'minimal deterrence' must be the watchwords.³⁹ Paris and London might also consider, as far as the law allows (i.e. within a broad interpretation of Article I of the NPT), giving political and technical assistance to certain new nuclear states such as India and Pakistan (on condition, of course, that the latter respect certain ground rules, especially the non-exportation of technologies) in order to help them to manage their nuclear arsenals, in cases where the possession of nuclear weapons is not illegal.

As permanent members of the UN Security Council the two countries must play as active and imaginative a part as possible in UN debates on nuclear non-proliferation. Together with their European partners with seats on the Council they could, in order for example to justify the isolation of North Korea and make China face up to its responsibilities, revisit in a more formal manner the UN Security Council Presidential statement of 31 January

37. The Union's Strategy against Proliferation of WMD of June 2003 does not rule out coercive measures, including the use of force as a last resort in accordance with the UN Charter.

38. The case of blackmail in the form of a threat or a nuclear strike on EU territory to prevent the Union intervening militarily is different: the question is not dealt with here, as it would be considered at a national level by the two members of the Union that have nuclear forces (see below).

39. One might add that the others should be responsible non-nuclear states. All present and new member states should sign up to the IAEA's additional protocols as quickly as possible. And the most fervent European advocates of nuclear disarmament (Austria, Ireland and Sweden) should not, as they sometimes seem to have done in the past, allow common positions to be reached on the basis of differing interpretations of the NPT.

1992, which described the proliferation of all WMD as ‘a threat to peace and security’.⁴⁰ They could also, together with their other partners in the West, help to devise new rules designed to proscribe the transfer of nuclear weapons, material or equipment by countries that are not parties to the NPT, and ensure compliance with those rules, including through the use of force.⁴¹

They should devote some thought to positive security guarantees, which are an essential instrument in nuclear non-proliferation, as experience in Europe and Asia has clearly shown.⁴² A fresh look at the guarantees given by Western countries is of current relevance, especially as it will reveal difficult dilemmas. For instance, is it preferable to protect the Saudi regime, with all that is reprehensible about it, or abandon Riyadh and run the risk that it will be tempted once more to follow the nuclear path?

Lastly, Paris and London also help to counter nuclear threats to the Union’s security. To meet the challenge of new nuclear states, deterrence and protection will be the last resort. Since 1991 a consensus has built up among the nuclear powers that nuclear deterrence has a role to play in countering NBC threats. In the likely absence of the money and political will required to deploy an anti-missile shield covering all of Europe, NATO’s nuclear deterrence will continue to be useful. But beyond that Britain and France as nuclear powers will, whether one likes it or not, form the Union’s last line of defence.

The final recommendation that should be made here is a simple one that can be summed up in one sentence: the European Union can help in reversing the emerging trend towards nuclear proliferation, but it must act now.

40. Germany played a significant part in the adoption of that statement.

41. A ban on the *geographical* transfer abroad of nuclear weapons (without any transfer of ownership) is one possible option that could avoid, say, the transfer of weapons from Pakistan to Saudi Arabia. Yet one should note that this would present a problem for the recognised nuclear powers, some of whom wish to retain this possibility during times of crisis. Moreover, today during peacetime the United States still keeps stocks of nuclear weapons in Europe for employment with American and allied air forces, as part of NATO’s nuclear burden-sharing and risk-sharing.

42. Negative security guarantees (undertaking not to use a given type of means against a country) can also be a useful instrument. Thus, the White House declared on 15 November 2002 that the United States had ‘no intention to invade’ North Korea. Security guarantees in general have been recognised by the Union as a useful instrument in the fight against proliferation.

The chemical and biological weapons threat

Jean Pascal Zanders

3

Introduction

Given the number of wars mankind has fought, chemical and biological weapons (CBW) have been used in only a tiny fraction of them. Chemical warfare as it is understood today – the military use of the toxic properties of certain chemical compounds against man or his environment – began in 1915 as a means to overcome the stalemate on the Western front. By the end of the First World War in November 1918, this novel mode of warfare had caused over a million casualties, including more than 100,000 fatalities. Since then, chemical weapon (CW) use was confirmed in some colonial wars. Some other major cases include employment by Italy in Abyssinia in the 1930s, by Japan in China in the 1930s and early 1940s, by Egypt in Yemen in the 1960s and by Iraq against Iran and its own Kurdish population in the 1980–88 war. The threat of CW use during the 1990–91 Gulf War raised fears of unconventional warfare in the post-Cold War era. In 1994 and 1995 the world witnessed the first lethal terrorist incidents involving the indiscriminate release of the nerve agent sarin in Matsumoto and Tokyo respectively.

Biological warfare – the intentional application of disease-causing micro-organisms or other entities that can replicate themselves (such as viruses, infectious nucleic acids and prions) or toxins (poisons produced by living organisms) against humans, animals or plants for hostile purposes – has been even rarer. There are some accounts of the deliberate spread of disease (notably bubonic plague and smallpox) before the First World War, but the limited understanding of pathogenesis and contagion prevented more frequent use. (During military campaigns armies have typically lost more personnel to disease than to combat.) In the First World War German agents committed acts of sabotage in the United States by infecting livestock and draft animals destined for the Allied forces in Europe and the Middle East. A better under-

standing of disease transmission in the 1920s and 1930s, combined with the dramatic experiences of the Spanish flu epidemic at the end of the First World War, increased concerns about biological warfare. Based on essentially faulty intelligence and fears of vulnerability, several countries, including France, Germany and Britain, began to look seriously into the suitability of certain pathogens for weaponisation. Germany's research and development remained splintered throughout the Second World War and did not lead to a useful biological weapon (BW). More concerted efforts in Canada, Britain and the United States led to the three countries pooling their resources. However, apart from a limited British capability to retaliate with anthrax against German cattle, the Allies produced no operational offensive biological weapon. The only country with a dedicated long-term offensive BW programme was Japan. Its research and development of agents and dissemination devices began in the early 1930s and lasted until the end of the war. The programme was also based on human experimentation in occupied China. On several occasions Japanese troops released biological warfare agents against Chinese villages and soldiers.

Research, development and production of offensive CBW after the Second World War was continued in essentially the Soviet Union and the United States. The new nerve agents – tabun, sarin and soman, which the Germans had discovered in the late 1930s while researching pesticides – rekindled their interest in chemical warfare. Most second-tier powers in Europe, however, gradually abandoned their offensive CBW programmes as they joined the North Atlantic Treaty Organisation (NATO) or the Warsaw Treaty Organisation. They continued work on chemical and biological (CB) defence, protection and prophylaxis.

During the Iran–Iraq war in the 1980s, Iraq extensively used CW in violation of then existing international law. The sustained chemical warfare campaigns, the first confirmed use since Egypt's CW attacks in Yemen in the 1960s, led to a heightened concern about CBW proliferation. In the 1990s the world learnt about the extent of Iraq's CBW programmes and the continuation of the Soviet BW programme in violation of the Biological and Toxin Weapons Convention (of which the USSR and now Russia is one of the three repositories). Furthermore, from the late 1970s onwards there were a growing number of (unconfirmed) allegations of CBW use (Vietnamese use of mycotoxins – the so-called

'Yellow Rain', and Soviet chemical and biological warfare operations in Afghanistan, Libyan use of CW in the war against Chad in 1987, use of CW in Angola in the late 1980s, and so on), leading to further speculation about secret programmes or CBW transfers.

In the twenty-first century the CBW proliferation debate is increasingly influenced by the emphasis on the dangers posed by asymmetric warfare: certain states might try to offset the conventional superiority of advanced powers with CBW and exploit the fact that parties to the CBW disarmament treaties have denied themselves these weapons.¹ Other concerns relate to the future application of biotechnology to weapons development, the increasing self-sufficiency of BW programmes, the difficulty of detecting CBW programmes and the use of denial and deception techniques for hiding them, and advances in dissemination technology.² CB terrorism has become another major security concern.

This paper first sketches the current assessment of the CBW proliferation threat. It notes the difficulties for researchers and analysts to independently verify the allegations as a consequence of the lack of information about the sources and the methodology used in preparing the proliferation reports. The following section highlights the respective strengths and weaknesses of the Biological and Toxin Weapons Convention (BTWC) and the Chemical Weapons Convention (CWC). The third part of the paper reviews EU policies to counter the threats from pathogens and toxicants, and then surveys some areas in which the policies could be expanded. The final section offers some conclusions.

The proliferation of CBW

Most of the public information on CBW proliferation is presented in annual reports or testimony to the US Congress by US agencies. According to the proliferation threat assessments by the Central Intelligence Agency (CIA), the Defense Intelligence Agency, and the Chemical and Biological Defense Program (CBDP) of the Department of Defense, seven countries have an offensive CW capability or are in the process of seeking such a capability: China, Iran, Iraq, Libya, North Korea, Syria and Sudan. The same countries, with the exception of Sudan, are listed as conducting BW-relevant programmes. China, India and Russia are listed as suppliers of

1. K. O'Brien and J. Nusbaum, 'Intelligence gathering on asymmetric threats - Part One', *Jane's Intelligence Review*, October 2000, pp. 50-5.

2. US Department of State, 'CIA Director Tenet Outlines Threats to National Security', *Washington File*, 21 March 2000; <http://www.usia.gov/cgi-bin/washfile/display.pl?p=/products/washfile/latest&f=00032103.plt&t=/products/washfile/newsitem.shtml>.

3. Central Intelligence Agency, 'Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, 1 January Through 30 June 2003', March 2003; available from <http://www.cia.gov/cia/reports/index.html>; Chemical and Biological Defense Program, *Annual Report to Congress* (Washington, DC: Department of Defense, March 2000), pp. 6–11, and *Volume I: Annual Report to Congress* (Washington, DC: Department of Defense, April 2003), pp. 4–7; and L. E. Jacoby (Vice Admiral), Statement for the Record, Senate Select Committee on Intelligence, 11 February 2003, and Senate Armed Services Committee, 12 February 2003, Defence Intelligence Agency; <http://www.dia.mil/Public/Testimonies/state ment10.html>.

4. Chemical and Biological Defense Program, *Annual Report to Congress* (Washington, DC: Department of Defense, March 2000), p. 11.

5. K. Rhodes, 'Diffuse security threats: Information on US domestic anthrax attacks', Testimony before the Select Committee on Intelligence, US Senate, and the Permanent Select Committee on Intelligence, House of Representatives, document GAO-03-323T (Washington, DC: US General Accounting Office, 10 December 2002), p. 2. (The document was declassified on 12 June 2003.)

6. J. A. Lauder, Special Assistant to the Director of Central Intelligence for Nonproliferation, 'Unclassified statement for the record on the worldwide WMD threat to the Commission to Assess the Organization of the Federal Government to combat the Proliferation of Weapons of Mass Destruction', 29 April 1999; http://www.odci.gov/cia/public_affairs/speeches/archives/1999/lauder_speech_042999.html; Arms Control and Disarmament Agency, 'Adherence to and compliance with arms control agreements', 1998 report submitted to the Congress, Washington, DC, 1999; <http://state.gov/www/global/arms/reports/annual/comp98.html>; and Central Intelligence Agency, Nonproliferation Center, 'Unclassified report

technologies that can be used in CBW programmes.³ Some of these countries are members of the CBW disarmament treaties, and in 2001 and 2002 the US government publicly named some of them in meetings of the states parties to the BTWC and the CWC (see below). The CBDP annual report of 2000 noted that the Department of Defense did not expect a significant increase in the number of government-sponsored offensive CBW programmes, but none the less thought that the proliferation threat would certainly rise.⁴ The report did not elaborate whether the 'increased threat' referred to qualitative developments (e.g., improved agents, production methods, or delivery systems) rather than to new countries acquiring CBW capabilities. In classified testimony to the Select Intelligence Committees of the US Senate and House of Representatives in December 2002, the US General Accounting Office (GAO) was less ambiguous: 'As of October 2002, intelligence assessments have not changed since 1990 for chemical and biological warfare threats on the battlefield or by terrorists'.⁵

The phrasing of the CBDP statement and the GAO testimony mark a significant shift away from claims in the 1980s and 1990s that the number of CBW possessors would have risen to 25–30 by the year 2000. For instance, the list of proliferant states quoted above is significantly shorter than the one reported by the CIA to the US Congress in 1999, which estimated that at least 16 states had active CW programmes and perhaps a dozen were pursuing offensive BW programmes.⁶ However, in contrast to a 1993 assessment by the (now defunct) Office of Technology Assessment, some countries that are friendly to or allied with the United States are conspicuously absent from the more recent lists: Egypt, Israel, Russia, Taiwan and South Korea (which has now officially declared a CW stockpile under the terms of the Chemical Weapons Convention).⁷

Assessing CBW acquisition programmes by states

Since the lists with states of proliferation concern may differ from year to year or even between agencies, there is a need to have a better understanding of proliferation processes and stages in order to be able to critically analyse the US claims. Furthermore, as most of the public statements and documents come from US officials (often anonymously), and agencies do not usually reveal their sources of information, independent verification of the allegations is close to impossible. Institutional interests or political motives for releasing

a particular piece of information (while withholding other information from the public) can be presumed, but, as a consequence, a factual assessment is often only possible long after the assertion has been made.⁸

Independent analysis is also hampered by the apparent lack of a definition of 'proliferation' and common criteria by which a country may be considered to constitute a proliferation threat (e.g., stages in an armament programme include a relevant scientific and industrial base; research and development activities; production; stockpiling of weapons; the development of military doctrine; training; and so on). This lack accounts for the discrepancies between assessments by different governments; and between those by intelligence agencies of a single country.

Furthermore, there seems to be an implicit assumption that the start of an armament programme must almost automatically lead to the deployment and possible use of CBW. Historical analysis, however, demonstrates that reversals of the proliferation process – i.e., deproliferation – also occurs. In fact, proliferation and deproliferation occur simultaneously and the mix of countries seeking CBW may differ at any given point in time.⁹ As a consequence, the possibility exists that some countries named in the proliferation lists silently abandoned their CBW programmes a while ago. Egypt, for instance, was known to have an active CW programme in the 1960s, as it used such weapons in the Yemen war. Today, its inclusion in some proliferation lists seems to be based on this historical fact and a judgement that it retains the capability to restart chemical agent production at short notice. Similarly, the United States continues to accuse Iran of holding CW stockpiles in violation of its commitments under the CWC.¹⁰ While Iran officially declared CW production facilities (whose destruction was certified by international inspectors), it never admitted to actually possessing CW. During the war with Iraq, Iran claimed the moral high ground and repeatedly underscored the un-Islamic nature of poison warfare. Public admission might imply loss of face for the Iranian leadership, which may therefore have decided to silently dispose of its CW stockpiles before it joined the convention.

There is little or no evidence of an international trade in ready-to-use CBW. Rather, states try to obtain legally or (increasingly) illegally the technologies – equipment, information, processes, knowledge and expertise, and so on – necessary to start up and

to Congress on the acquisition of technology relating to weapons of mass destruction and advanced conventional munitions, 1 January through 30 June 1999', Washington, DC, February 2000; http://www.odci.gov/cia/publications/bian/bian_feb_2000.html.

7. Office of Technology Assessment, *Proliferation of Weapons of Mass Destruction: Assessing the Risks*, OTA-ISC-559 (Washington, DC: US Government Printing Office, August 1993), pp. 65–6.

8. The urgent threat with chemical, biological and nuclear weapons was presented by the United States and the United Kingdom as a major justification for pre-emptively invading and occupying Iraq in March 2003. Many facts offered in support of this threat assessment (e.g., mobile BW production units, importation of uranium from Africa, observation of prohibited activities at certain facilities) proved to be of highly questionable value. The British claim, made in September 2002, that Iraq was able to launch its unconventional weapons within 45 minutes has become the subject of a public enquiry following the apparent suicide of a leading British weapons expert. He had privately expressed his reservations about this claim to members of the press, and thereby contributed to the public debate about the government's manipulation of intelligence in order to gain public support for the war. According to a press report quoting an internal Foreign Office document, the 45-minute claim was based on a single Iraqi anonymous uncorroborated source quoting another anonymous uncorroborated source. V. Dodd, N. Watt and R. N. Taylor, '45-minute claim on Iraq was hearsay', *Guardian*, 16 August 2003; <http://politics.guardian.co.uk/keilly/story/0,13747,1020034,00.html>.

9. J. P. Zanders, 'Tackling the demand side of chemical and biological weapon proliferation', in D. Schroeder, and E. Mirco (eds.), *Technology Transfer* (Aldershot: Ashgate Publishing Ltd, 2000), pp. 167–86.

10. S. G. Rademaker, 'National statement to the First Review Con-

support a domestic armament programme. Most of these technologies have a dual-use potential: they have legitimate purposes, but can also be diverted for the development of prohibited weapons. It is important to note that even without dedicated proliferation strategies, a growing number of societies are acquiring the scientific and technological base necessary for setting up CBW programmes as a consequence of the natural diffusion of technology resulting from global scientific and industrial development.

As noted earlier, an assessment of the CBW proliferation threat based on open sources is precarious because of the underlying subjective judgment of intent with regard to the application of certain technologies. The problem is exacerbated by the legality of CBW defence programmes under the CBW disarmament conventions. Such programmes may include the development and production of individual and collective protection, detection equipment, medical pretreatment and prophylaxis, training of troops to operate in a contaminated environment, and so on. Each of these activities may require the production of live agents or simulants, the study of the behaviour of such agents in different physical and environmental settings, and research into potential future threat agents. None of them would differ fundamentally from those necessary for an offensive programme.

Assessing CBW acquisition programmes by non-state actors

Over the past few decades concern has also grown rapidly about the acquisition of CBW by non-state actors like terrorists or criminals. Chemical and biological agents have been used in several terrorist attacks. In September 1984 the Rajneesh religious cult poured a solution containing *Salmonella typhimurium* in the salad bars of several restaurants in The Dalles, Oregon, causing food poisoning in 751 people. The Japanese extremist cult Aum Shinrikyo carried out attacks with the nerve agent sarin in Matsumoto and Tokyo in 1994 and 1995. In the wake of the terrorist strikes against the United States on 11 September 2001, an as yet unidentified person or group mailed letters contaminated with anthrax spores to leading members of the US Congress and media. In addition to these attacks, several terrorist organisations, including al-Qaeda, and criminal associations are reported to be seeking or trafficking toxic and pathogenic substances. However, solid evidence of advanced acquisition programmes is generally lacking, and since the beginning of the twentieth century the number of incidents has

ference of the Chemical Weapons Convention', US Delegation to the Organisation for the Prohibition of Chemical Weapons, The Hague, 28 April 2003.

remained low. As with the economic, scientific and technological development of states, the mere fact that more people across the world obtain advanced schooling and training in biology and chemistry means that the risk of an individual misusing that knowledge and those skills for malicious intent increases.

The Aum Shinrikyo experience underscored the technical hurdles even a well-resourced organisation would face if it wanted to set up a domestic CBW programme. The sarin attacks in Japan suggest that a terrorist CW attack may result in few fatalities while numerous victims will probably suffer short or low-level exposure to the chemical agent.¹¹ The attacks with mail-delivered anthrax spores demonstrated that mass casualties need not result even if terrorists use one of the potentially most lethal biological agents.¹² In fact, catastrophic scenarios with large numbers of casualties involving CBW, which feature in many policy debates, are often made plausible by insistence on a threat posed by state-sponsored terrorism. There exists considerable doubt as to whether states might be willing to transfer CBW to terrorist entities. In particular, governments never fully control transnational terrorist organisations, which might one day turn against their erstwhile sponsor. They will also fear that the source of the CB agents could easily be traced back to them, thus leading to international condemnation and possible military retaliation. In contrast to nuclear weapons, advanced conventional systems or missiles, governments do not publicly announce the possession of CBW, and state sponsorship of terrorist CB attacks would expose them as maintaining illicit weapon programmes. Finally, CBW usually belong to the highest level of technological development possible for the country seeking such weapons, and governments are therefore unlikely to allow their perceived military advantage to slip out of their hands.

However, in addition to causing human casualties, acts of terrorism may aim to sabotage or disrupt the economy. Chemical and agricultural terrorism comes easily within reach of single-issue groups, criminals or loosely structured organisations. A wide range of industrial chemicals (ranging from highly poisonous substances to oil) can be released into nature with little prior preparation (e.g., damaging storage tanks) for purposes of economic sabotage or blackmail by threatening environmental destruction. Biological agents arguably offer the prospect of larger-scale economic disruption as they can be used to infect live-

11. J. P. Zanders, 'Assessing the risk of chemical and biological weapons proliferation to terrorists', *Nonproliferation Review*, vol. 6, no. 4 (Fall 1999), pp. 17–34. A computer simulation recreating the 1994 sarin attack in Matsumoto with optimised parameters suggests that the number of fatalities and other victims would not have differed significantly in the case Aum Shinrikyo had used pure nerve agent. J. P. Zanders, E. Karlsson, L. Melin, E. Näslund and L. Thaning, 'Risk Assessment of Terrorism with Chemical and Biological Weapons', *SIPRI Yearbook 2000: Armaments, Disarmament and International Security* (Oxford: Oxford University Press, 2000), pp. 537–59.

12. J. P. Zanders, J. Hart and F. Kuhlau, 'Chemical and biological weapon developments and arms control', *SIPRI Yearbook 2002: Armament, Disarmament and International Security* (Oxford: Oxford University Press, 2002), pp. 696–703. A computer simulation of an indiscriminate attack with anthrax bacteria over a shopping mall also suggests that the number of fatalities would be limited. J. P. Zanders et al., op. cit. in note 11, pp. 549–54.

stock or destroy crops. Given the time needed for an animal or plant disease to develop, the attack will invariably stretch over a prolonged period of time. The demand for containment, remediation and compensation will draw in both local and national authorities. The economic damage would not be limited to the destruction of produce, but also affect other enterprises that depend on agricultural activities and international trade. Countries, regions or communities that depend on monoculture for their livelihood are particularly vulnerable.

The types of organisations that may want to use toxic or pathogenic substances vary greatly. Large-scale terrorist operations involving complex toxic or disease-causing substances also found in military arsenals appear to be associated with highly integrated, vertically structured organisations, such as religious cults. The looser or the smaller the structure of the organisation – e.g., those of right-wing extremists and supremacists, animal rights activists, or even disgruntled individuals – the more probable that these terrorists will seek toxic chemicals that are commonly available or relatively easy to manufacture, or pathogens than are less of a threat to humans. In some cases a toxicant has been released from storage tanks into a river,¹³ a caustic agent thrown at the victim or food products tampered with using a syringe.¹⁴ While these cases illustrate the constraints technology imposes on what can be achieved and the linkage of low technology to limited goals, simple dissemination devices would be enough to cause major economic harm or disruption if a terrorist were to resort to a highly infectious non-zoonotic pathogen such as foot-and-mouth disease. (To achieve similar results with plant pathogens a more sophisticated device would be needed, as they are highly dependent on environmental conditions.)

The nature of the threat may also vary in time. For example, the threat of catastrophic terrorism by millenarians using CBW in order to recreate Armageddon (such as Aum Shinrikyo) has receded with the turn of the millennium. However, millenarianism also exists in non-Christian religions, and since they use different calendars, their careful study may be required in order to determine when that particular threat might resurface.

13. For example, in July 2000, laid-off workers of a chemical firm in the northern French town of Givet poured some 5,000 litres of sulphuric acid into a tributary of the Meuse river in order to force the French government to agree to their demands regarding severance pay and unemployment benefits. The French government partially gave in to the demands. C. Mathiot, 'Les employés de Cellatex déversent leur détresse' [The employees of Cellatex spill their distress], *Libération*, 18 juillet 2000; see <http://www.libération.fr/quotidien/semaine/20000718/18mara.html>; and E. Cué, 'Ecoterrorism as negotiating tactic', *Christian Science Monitor*, 21 July 2000; <http://www.csmonitor.com/durable/2000/0721p8s1.htm>.

14. Several such incidents are discussed in J. P. Zanders et al., op. cit. in note 11, pp. 540–45.

Prohibitions against CBW

Limitations on the use of poisonous and infectious substances in armed conflict have a long history and were present in several civilisations.¹⁵ They began to be codified during the second half of the nineteenth century, and the first multilateral agreements were reached during the First Hague Peace Conference in 1899. Today, the international regime against CBW is principally governed by the Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or other Gases, and of Bacteriological Methods of Warfare, signed in Geneva in June 1925, the 1972 Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction (Biological and Toxin Weapons Convention, BTWC) and the 1993 Convention on the Prohibition of the Development, Production, Stockpiling And Use of Chemical Weapons And on Their Destruction (Chemical Weapons Convention, CWC).

The Geneva Protocol belongs to the laws of war, which restrict the use in combat of certain types of weapons or modes of warfare that are deemed to be inhumane. It was an interim measure pending the conclusion of a comprehensive disarmament treaty, which was supposed to deal with questions of CBW production and possession. The worsening security climate in Europe during the first half of the 1930s contributed to the failure of the disarmament conference, and as a consequence the Geneva Protocol stood as the sole legal prohibition against chemical and biological warfare until the 1970s. Despite the expression of reservations by several contracting parties, and its occasional flagrant violation with regard to CW, the agreement set a moral norm that has prevented the general acceptance of chemical and biological warfare as normal modes of combat. In the light of the many allegations of chemical warfare in the Iraq–Iran war the UN General Assembly adopted Resolution A/RES/42/37 of 30 November 1987 empowering the UN Secretary-General ‘to carry out investigations in response to reports that may be brought to his attention by any Member State concerning the possible use of chemical and bacteriological (biological) or toxin weapons that may constitute a

15. Before the emergence of a science-based understanding of the propagation of disease in the nineteenth century, the concept of poison weapons generally included the more recent category of biological weapons.

violation of the 1925 Geneva Protocol or other relevant rules of customary international law in order to ascertain the facts of the matter, and to report promptly the results of any such investigation to all Member States'.¹⁶ The UN Secretary-General can thus authorise the investigation of such allegations without the formal backing by the UN Security Council.

The BTWC and the CWC belong to the law of disarmament. The BTWC was opened for signature on 10 April 1972 and entered into force on 26 March 1975. As of October 2003, 151 states have ratified or acceded to the BTWC and another 16 have signed, but not ratified the convention.¹⁷ The CWC was opened for signature in Paris from 13 to 15 January 1993 and entered into force on 29 April 1997. As of October 2003, 154 states have ratified or acceded to the CWC and another 25 have signed but not ratified the convention. In contrast to the BTWC, the CWC has created an international organisation to oversee the implementation of the convention, the Organisation for the Prohibition of Chemical Weapons (OPCW). Its headquarters is in The Hague.

Disarmament treaties, in the strict sense of the term, order the complete elimination of a particular weapon category and disallow any preparation (development, production, stockpiling, doctrine development, training, deployment) for its use in war. In contrast to arms control agreements, parties to a disarmament treaty cannot in any circumstances retain a residual capability of the weapon under consideration, and must therefore ensure those aspects of their security that were covered by the prohibited weapon category through alternative means, whether diplomacy, membership of alliances or the acquisition of non-prohibited weaponry.

Both conventions are important non-proliferation tools. They formalise strong norms against the acquisition and use of CBW, and to different degrees they allow other states to observe and evaluate compliance with the treaty provisions. Parties actively try to strengthen the treaty regimes in spite of many technical and political hurdles. Given their almost universal adherence, the conventions also exert strong pressures on non-states parties, as is evidenced by the lack of public admissions to chemical or biological weapon holdings. As a consequence, governments cannot and will not boast about CBW as a matter of national prestige in ways they might do with regard to nuclear weapons or ballistic missiles. (Neither category is the subject of a comprehensive disarmament

16. UN General Assembly, Resolution A/RES/42/37 'Chemical and bacteriological (biological) weapons', 84th Plenary Meeting, 30 November 1987, Section C, 'Measures to uphold the authority of the 1925 Geneva Protocol and to support the conclusion of a chemical weapons convention', para. 4.

17. Following ratification or accession to a treaty, a state assumes all the obligations contained in the treaty. Signature without ratifications implies, according to the 1968 Vienna Convention, that a state will undertake nothing that violates the objectives of the treaty, but will not be subject to, for example, the declaration and inspection obligations of a disarmament convention.

treaty.) While they already have a great impact on state behaviour, both the BTWC and the CWC need to be further developed. Improvements in verification techniques and transparency may remove ambiguities about compliance. Furthermore, the treaties must have sufficient flexibility to face the challenges of scientific and technological development and changes in the international security environment.

The norms in the BTWC and the CWC also apply to legal and natural persons. Since states parties must ensure that no prohibited activities take place on their territory, they are required to promulgate national legislation. In particular, criminal and penal law based on the conventions can be important tools to prevent and punish CB terrorism and the involvement of companies and individuals in the CBW programmes of other states. Strong internal and external transfer controls will restrict access to relevant technologies to legitimate people, research institutes and companies only. Despite its significance for the strength of the treaty regimes, national implementation remains an undervalued tool in the efforts to counter the use of disease or toxicants for hostile purposes. Similarly, professional and scientific organisations can adopt the international prohibitions in their codes of conduct and ethical norms.

The BTWC and the CWC have their respective strengths and weaknesses. However, their relevance in preventing the proliferation of CBW and CB terrorism depends first and foremost on the perception of their utility in achieving these goals states have, and the political and financial resources they are willing to invest in cooperative security and hence in the further development of the respective regimes.

The BTWC and CWC as deproliferation regimes

Key to the deproliferation regimes are the comprehensive prohibitions on the development, acquisition, possession and use of CBW. Article I of the BTWC specifies that states parties cannot acquire or retain BW in any circumstances. The Fourth Review Conference of States Parties, held in 1996, formally expanded the scope of this article to cover BW use.¹⁸ The core prohibition is reinforced by the requirement in Article II to destroy or divert all BW to peaceful uses and by the non-proliferation provision of Article III. In the CWC, these prohibitions and obligations are grouped in Article I.

18. The BTWC does not explicitly prohibit the use of BW in armed conflict, but refers for this to the Geneva Protocol. Since the entry into force of the BTWC, the understanding that BW cannot be used in any circumstances has gained strength as many states have withdrawn their reservations to the Geneva Protocol with respect to BW.

Joining the BTWC or the CWC is thus the clearest statement of deproliferation or future non-acquisition of CBW a government can make.

General purpose criterion

Both conventions achieve the comprehensiveness of their respective prohibitions by means of the so-called 'general purpose criterion' (GPC). According to Article I of the BTWC, no biological agent or toxin, irrespective of its production method, is to be acquired or retained unless justified for prophylactic, protective or other peaceful purposes. In the CWC, the GPC is incorporated in Article II, which defines a CW as any toxic chemical or its precursors intended for purposes other than those not prohibited by the CWC as well as munitions, devices or equipment specifically designed to be used with them. Non-prohibited purposes include industrial, agricultural and medical applications, research and development of protection and defence against CW, and domestic law enforcement and riot control. Lachrymatory agents or herbicides, for example, are not banned as long as their production and retention are consistent with the goals of the CWC. Some chemicals have essentially no purpose other than use in the manufacture of chemical warfare agents. They are consequently banned entirely except for small quantities for medical research or the development of protective equipment. The CWC is thus explicit in what it considers 'non-prohibited purposes', whereas the more positive formulation of 'other peaceful purposes' in the BTWC is open-ended and therefore more difficult to apply objectively. Through interpretation at review conferences, the international community agrees that the formulation does not include deterrence or defence with BW.

The GPC affords two major advantages. First, it enables both conventions to deal with future discoveries and technological developments, as new potential warfare agents will be automatically banned if they have no justifiable non-military purpose. Thus the BTWC covers not only existing but also new or genetically modified biological agents. Similarly, the CWC is not restricted to compounds which are explicitly listed in the convention. Moreover, the research installation or production facility where the new CW agent has been made can become the object of inspection under the CWC. Second, the GPC allows the interna-

tional community to deal with dual-use commodities. Pathogens and toxins occur naturally and are therefore impossible to ban as such. Many of the chemicals covered by the convention have widespread civilian application. Because the GPC makes it possible to distinguish between permitted and prohibited activities, it is not necessary to determine the intrinsic threat posed by a pathogen or a chemical compound.

Verification and compliance

Despite their foundation on similar principles to maximise the comprehensiveness of the core prohibitions, both conventions differ considerably with respect to their ability to enforce compliance and verification. The BTWC lacks meaningful verification mechanisms, and while states parties have agreed to transparency-enhancing measures at the review conferences, these remain politically binding. Submission of the annual reports on relevant activities consequently remains poor. The efforts to negotiate a legally binding protocol to supplement the BTWC failed in August 2001, as an effect of the loss of confidence in multilateral security regimes by the United States and its unwillingness to render its BW defence programmes more transparent (in part for fear of revealing its weaknesses to its rivals). The biotechnology industry was also extremely reluctant to accept inspections and other verification instruments for fear of loss of propriety information and commercial secrets. In addition, since it appeared unlikely that the United States might join the protocol, the biotechnology industry in Europe and Asia became increasingly unwilling to endorse the new verification regime, as that would burden their companies with commercial disadvantages in a highly competitive global market.

The CWC, which enjoyed significant industrial support during its negotiation, establishes a comprehensive verification regime to ensure that no illegal activities take place inside states parties. The regime affects both the military sector and the civilian chemical industry. It seeks to balance confidence in compliance with the protection of national security interests and industrial proprietary information. Verification consists essentially of regular reporting requirements, on-site inspections and, in the case of well-founded suspicions, challenge inspections.¹⁹ The OPCW is charged with the organisation and execution of the verification regime.

19. Article IX of the CWC provides for several mechanisms to address suspected non-compliance, ranging from bilateral consultations to an on-site challenge inspection. The latter tool is politically sensitive because of its high public profile. It can be requested by any state party in case it suspects non-compliance with the CWC, and the challenged state party may neither refuse an inspection nor improperly restrict the access of the inspection team.

States normally voluntarily join international disarmament treaties, and as a result they are presumed to comply with their obligations and to cooperate with each other to give the other parties sufficient guarantees of their compliance. In the case of compliance concerns, the BTWC merely provides for consultations among parties and recourse to the UN Security Council. However, the limits of the latter procedure were clearly demonstrated by the fact that the United States never took its serious suspicions about Soviet non-compliance (e.g., the 1979 anthrax outbreak near Sverdlovsk, or the 'yellow rain' allegations in South-East Asia) to the United Nations. The CWC, in contrast, has more developed procedures that range from bilateral consultations over involvement of the various organs of the OPCW to challenge inspections, which the challenged state cannot refuse. The option of taking the compliance issue before the UN General Assembly or the Security Council also exists.

Over the recent years, the question of compliance enforcement has been raised in particular by US allegations that some parties to the BTWC and the CWC are violating their treaty commitments at meetings of the states parties to these conventions. At the Fifth Review Conference in November 2001, the US representative publicly accused three parties to the BTWC – Iran, Iraq and Libya – of maintaining offensive BW programmes.²⁰ All three countries denied the accusation. The inability of the BTWC to address such challenges to its validity underscores the need to develop mechanisms to assure and ensure compliance. On the opening day of the First CWC Review Conference, the United States expressed particular concern about Iran's offensive CW programme.²¹ Iran formally rejected the accusation. The latter case is of particular concern for the future of the CWC, as the United States has so far not attempted to exhaust the mechanisms available under the convention to address concerns over compliance, so that the international community cannot satisfy itself as regards the validity of the allegation or the degree of Iran's abidance by its treaty obligations. If repeated in the future, such unresolved allegations may well undermine international confidence in the CWC as a security regime.

20. Statement of John R. Bolton, Under Secretary of State for Arms Control and International Security, US Department of State, to the Fifth Review Conference of the Biological Weapons Convention, United States Mission, Office of Public Affairs, Geneva, 19 November 2001. The other three states named were North Korea, Sudan and Syria, as well as the al-Qaeda terrorist network.

21. Statement of Stephen G. Rademaker, Assistant Secretary of State for Arms Control, to the First Review Conference of the Chemical Weapons Convention, US Department of State, Washington, DC, 28 April 2003. The United States also named three non-states parties: Libya, North Korea and Syria, and stated that it was trying to resolve its concerns with another state party, Sudan, through bilateral consultations.

The non-proliferation obligation

Being disarmament treaties, the BTWC and CWC focus on the total elimination of existing stockpiles and on the prevention of future armament programmes. In essence, the so-called non-proliferation clauses expressly forbid members to transfer CBW to other states parties, non-states parties (which include signatory and non-signatory states) or subnational entities in any circumstances. They further disallow any activity that would assist, encourage or induce anyone to engage in any undertaking that contravenes either convention. However, these provisions are formulated in accordance with the core disarmament goals, and despite their comprehensiveness they are underdeveloped. The BTWC does not elaborate further on Article III. The CWC, in contrast, has established an embryonic export control regime for the transfer of toxic chemicals to states parties and non-states parties that, together with industry verification, will gain in relevance after the declared CW stockpiles have been destroyed.

While the overriding criterion of Article VI of the CWC is that no transaction may contravene the basic purpose of the convention, the export control mechanism is based on three schedules of chemicals (which also play a significant role in the verification regime for the chemical industry). These lists categorise chemical compounds of particular concern depending on their relative importance for the production of CW agents or for legitimate civilian manufacturing processes. Schedule 1 contains compounds that can be used as CW and have few uses for non-prohibited purposes. They can be transferred between any two states parties only for research, medicine, pharmaceutical use or protection, and only in specified quantities. These chemicals cannot be retransferred to a third state. Such transactions are subject to detailed reporting requirements by both states parties. Schedule 2 includes chemicals that are key precursors to CW but which generally have greater commercial application. Since the third anniversary of the CWC, states parties have been entitled to transfer Schedule 2 chemicals only among themselves. These transactions, however, are not subject to stringent quantitative conditions or reporting requirements like those for Schedule 1

22. Following the collapse of the negotiation of a legally binding instrument to strengthen the BTWC in the summer of 2001, the 5th Review Conference failed to review the convention. In December 2001, the meeting was adjourned, and in the resumed session in November 2002 the states parties barely agreed to hold annual meetings in November preceded by two-week expert meetings in August until the 6th Review Conference in 2006. The agreed themes for consideration are (i) national measures to implement the prohibitions in the BTWC, including penal legislation, and (ii) national mechanisms to establish and maintain the security and oversight of pathogenic micro-organisms and toxins (2003); (iii) enhancing international capabilities to respond to, investigate and mitigate the effects of alleged use or suspicious outbreaks, and (iv) strengthening efforts for the surveillance, detection, diagnosis and combating of infectious disease (2004); and (v) content, promulgation, and adoption of codes of conduct for scientists (2005). Final Document of the Fifth Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) Weapons and on Their Destruction, document BWC/CONF.V/17, November 2002, pp. 3-4; available at <http://disarmament.un.org/wmd/bwc/pdf/bwccnf17.pdf>.

23. BioWeapons Prevention Project, 'The new process: First impressions and the way ahead', Seminar Report no. 1, 25 September 2003; available at www.bwpp.org.

chemicals. Schedule 3 chemicals can be used to produce CW but are also used in large quantities for non-prohibited purposes. Their transfer is only discussed in relation to non-states parties: there are no quantitative limits. However, the exporting state party must ensure that they will not be used for purposes prohibited by the convention, and an end-use certificate is required which meets the minimum stipulations imposed by the convention. End use is the object of routine reporting by a state party or, if the need arises, of verification inspection.

Article VI of the CWC opens with an explicit reference to the GPC. In this way the CWC overcomes the past inability to distinguish unambiguously between the trade in chemicals used as warfare agents and those that have peaceful industrial purposes. It also imposes on states parties the responsibility to ensure that no transfer of a toxic compound – including ones involving unscheduled chemicals – will contribute to a violation of the core prohibitions of the CWC.

National implementation requirements

Disarmament treaties govern the behaviour of states in their interactions with other states. In order to make the treaty obligations applicable and enforceable with regard to legal and natural persons operating inside the borders of a country, a state party must adopt national implementation legislation. Article IV of the BTWC obliges parties to take 'any measures' – a formulation widely interpreted as meaning national implementation legislation – necessary to enforce the obligations in Article I within their borders. Compliance with this article remains poor, despite the reminder of a requirement agreed in 1994 to submit annual declarations on a range of national implementation measures (including legislation). In August 2003 experts of the states parties met in Geneva to review existing national implementation and to consider improvements and additional measures for consideration by the 6th Review Conference of the BTWC in 2006.²² Several governments recognised that as a result of the meeting they had acquired a better understanding of their responsibilities with regard to national implementation of the BTWC.²³

Article VII of the CWC requires state parties to adopt national implementation legislation, which includes not only the application of the treaty obligations to the activities of natural and legal

persons, but also the enactment of penal legislation to cover any prohibited activity undertaken anywhere by a national of the state party concerned. (In other words, the penal legislation must have an extraterritorial dimension.) States parties must inform the OPCW of their implementing legislation and other administrative measures taken. Despite the compulsory character of Article VII, compliance remains poor as the article only provides a general framework. As a consequence of the lack of precise directives, there is little harmonisation of the laws and regulations of individual states parties. The Technical Secretariat of the OPCW offers national implementation assistance (training courses, model legislation, etc.) and tries to formulate guidelines for harmonised regulations and laws. While the existence of an international organisation means that the success rate is far greater than that of the BTWC, many parties to the CWC still lack adequate national implementation measures or have none at all.

Technology transfers

Although the non-proliferation obligation forms a core part of the disarmament regimes, the BTWC and the CWC also guarantee states parties the right of access to treaty-relevant technologies. Article X of the BTWC and Article XI of the CWC give the parties the right to participate in the fullest possible exchange of equipment, materials, and scientific and technological information of relevance to the convention for non-prohibited purposes. They also encourage the parties to facilitate such exchanges. The articles also order parties to implement the respective conventions in such a way that the economic or technological development of other states parties is not hampered. These provisions (which can also be found in the 1968 Nuclear Non-Proliferation Treaty as part of the trade-off to forgo the acquisition of nuclear weapons) are an important tool that can be used to achieve universal adherence, as they help to offset the financial cost of participating in and implementing the conventions. However, implementation of the articles has become more contentious as chemistry and biotechnology play an increasingly dominant role in economic and societal development, but may also make it easier for a state to acquire an offensive CBW capability.

The countries that were directly involved in the Cold War confrontation in particular stress the security dimension of the

BTWC and CWC (destruction of weapons, non-proliferation), whereas the states on the periphery of the former East–West rivalry emphasise their right to development. The export controls to prevent CBW proliferation, which a number of industrialised states coordinate through an informal arrangement known as the Australia Group, are viewed by some developing countries as discriminatory and a violation of the obligation not to hamper their economic or technological development.²⁴ Over the past decade the controversy has had a polarising effect, which in turn has complicated the implementation of the CWC and the negotiation of the protocol to strengthen the BTWC.

Dealing with CBW proliferation: some options for the EU

The events of 11 September 2001 increased the sense of vulnerability to indiscriminate mass-casualty terrorism across the world. This sense of vulnerability was further augmented by a series of letters with anthrax spores sent to representatives of the US media and politicians. Despite the difference in scale, both events demonstrated the potential of such attacks for widespread social and economic disruption. Earlier preoccupation with terrorism involving CBW focused on the potential to cause large numbers of casualties. The probability of such events occurring remains low, because of the technological challenges involved in the development, manufacture and dissemination of CB agents and the demands these challenges place on the organisational structure of the terrorist entity. However, as noted earlier, beyond causing human casualties, acts of terrorism can be directed at generating economic sabotage or disruption.

Since it is impossible to pre-identify the targets, CB terrorism strikes at society as a whole. The perpetrators may be domestic or foreign, and they can select from a wide range of agents and means of delivery, many of which are easily obtainable in industrialised and scientifically advanced societies. Given the uncertainties and the wide range of plausible scenarios, it may be opportune to identify generic and cost-effective countermeasures, which can also contribute to a society's overall health and safety standards.

24. The Australia Group created in 1985 is an informal arrangement whose objective is to limit the transfer of chemical precursors, equipment used in the production of CBW and biological warfare agents. The participating states have agreed to apply decisions taken collectively at the annual meetings through their national export control systems. The original objective of the Australia Group was to prevent CW proliferation while the negotiations to complete the CWC were being undertaken. Subsequently, it has also acted to prevent BW proliferation during the process of developing improved measures to ensure compliance with the BTWC. Information on the Australia Group and its export control lists is available from <http://www.austriagroup.net>.

The EU response to the CBW threat after September 2001

The EU's attention to the possible threat of CB terrorism was raised following the events in September 2001. The discovery during a police raid of ricin traces in a London flat in January 2003 served as a reminder of the potential terrorist threat to European societies. Based on its competence in the fields of health and health security, the EU launched several initiatives to prevent and counter threats and mitigate the effects of CB attacks.²⁵ Meeting in extraordinary session in Brussels on 21 September 2001, the European Council agreed on an action plan to coordinate EU policies against terrorism. At its emergency meeting in Ghent, Belgium on 19 October 2001, the European Council investigated the need for further action regarding threats posed by chemical, biological and radiological weapons,²⁶ and requested the Commission of the European Communities to set up a programme to enhance cooperation among EU members with regard to risks, alerts and intervention; the storage of means of intervention; and research.²⁷ Furthermore, the Health Security Committee (HSC) was established on 26 October 2001. It brings together high-level representatives of the health ministries and acts as a cooperative organ to counter terrorist and criminal acts involving pathogens and toxicants. At the meeting of the health ministers of 15 November 2001, the Commission was instructed to develop an action programme of cooperation on preparedness and response to CB threats. The priorities focused on the creation of mechanisms to facilitate consultation among EU members; the setting up of inventories of European laboratories and available serums, vaccines and antibiotics; the establishment of a European network of experts on the evaluation, management and communication of risks; and the promotion of the development of vaccines, medicines and treatments.²⁸ Other measures relate to cooperation among the civil emergency services of EU member countries.

The HSC set up a health security programme code-named 'Biological and Chemical Attacks and Threats' (BICHAT) on 17 December 2001 in response to the conclusions of the November meeting of the health ministers. The programme, which has been implemented since May 2002, comprises 25 actions under four objectives:

1. the establishment of a mechanism for information exchange, consultation and coordination for handling health matters related to attacks;

25. It should be noted that whereas 'traditional' terrorism is a competence of member states, the EU can deal with terrorism involving CB agents as a consequence of its health implications. Commission of the European Communities, Directorate G–Public Health, 'Programme of cooperation on preparedness and response to biological and chemical agent attacks [Health security]', document G/FS D(2001) GG, 17 December 2001.

26. In June 2002 the EU Council formally expanded the scope of its anti-terrorism programme to include nuclear and radiological weapons.

27. Commission of the European Communities, 'Communication from the Commission to the Council and the European Parliament on Cooperation in the European Union on Preparedness and Response to Biological and Chemical Agent Attacks', document COM(2003), 320 final, *Official Journal of the European Communities*, Brussels, 2 June 2003, p. 4, para. 2.

28. *Ibid.*, pp. 5–6, para. 9.

2. the creation of an EU-wide capability to detect and identify CB attacks and rapid assessment and diagnosis of relevant cases;
3. the creation of stocks of medicines, the establishment of a stand-by facility for medicine production, and the setting up of a database of health services and health care specialists; and
4. the drawing-up and dissemination of guidance in the case of CB attacks, and the coordination of the EU response with other countries and international organisations.²⁹

One of the more concrete realisations of the programme has been the functioning of a rapid alert system, code-named RAS-BICHAT, since June 2002. The system, which is permanently operational, notifies the HSC members of incidents involving the threatened or actual release of CB agents. It links up with the EU early warning and response system for the prevention and control of communicable diseases (set up in September 1998)³⁰ and the civil protection mechanism (set up in October 2001).³¹ According to a Communication published in June 2003, RAS-BICHAT has been used on five occasions and tested five times, and it is being further developed and adjusted in the light of experience.³²

All EU members are participants of the Australia Group, and the control lists of dual-use equipment and technologies have been incorporated into EU law. The EU fears that the controls may have an adverse impact on the ability to quickly ship agents, samples, reagents and specimens in the event of an emergency. To this end EU members are consulting with each other in order to agree a common position on appropriate criteria for, among other things, exemptions from export control rules of transfers made by public health institutes, laboratories, agencies and centres.³³ The press release following the Australia Group meeting in June 2003 does not indicate whether the EU concern was discussed.³⁴

The EU continues to refine its strategic objectives and develop its programmes in order to meet the counter-terrorism and biosecurity goals.³⁵

Political and juridical means

Legal and political instruments developed and implemented before an act of CB terrorism takes place make up an important group of generic, cost-effective measures. All EU members are parties to the BTWC and the CWC, and all candidate states are similarly required to be party to both conventions before they can join

29. *Ibid.*, p. 8, para. 16.

30. European Commission, Decision no. 2119/98/EC of the European Parliament and of the Council of 24 September 1998 setting up a network for the epidemiological surveillance and control of communicable diseases in the Community, *Official Journal of the European Communities*, L268, Brussels, 3 October 1998, pp. 1–7.

31. Council Decision 2001/792/EC, EURATOM of 23 October 2001 establishing a Community mechanism to facilitate reinforced cooperation in civil protection assistance interventions, *Official Journal of the European Communities*, L297, Brussels, 15 November 2001, p. 7.

32. *Op. cit.* in note 27, p. 9, para. 20.

33. *Ibid.*, pp. 10–11, para. 24.

34. Australia Group, Press release, June 2003; available at http://www.australiagroup.net/en/releases/press_2003_06.htm.

35. George Gouvras, 'EU action on health security: Review of activities, current status, perspectives', presentation made during the meeting of experts of the States Parties to the BTWC, Geneva, 19 August 2003.

the EU. Moreover, all EU members coordinate their export controls with regard to items that could be used to develop or produce CBW within the framework of the Australia Group. The European Commission participates as an observer in the group's meetings.

The fact that all EU states are also member of both conventions in particular signifies that all legal instruments adopted by the Community as a whole or by individual states can and must be rooted in the global norms adopted to curb CBW. In particular, anti-terrorism and non-proliferation provisions in national criminal law ought to be based on the general purpose criterion of the BTWC and CWC. The incorporation of the GPC in national legislation (whether as part of laws to make the prohibitions in the international conventions applicable to natural and legal persons on the territory or under the jurisdiction of a state party or as part of criminal law) enables law enforcement authorities to apprehend terrorists or criminals before they have committed their act, on the grounds that their possession of agents or equipment cannot be justified under the terms of the BTWC and the CWC. Similarly, the GPC can be invoked to stop any attempt to assist the acquisition of CBW by states or individuals before the transaction takes place. In contrast to export control rules (which deal with transfers outside the EU), regulations based on the GPC also apply to transfers within the EU area, or between economic units inside a single country.

Ideally states coordinate their legislation with each other, especially in the framework of political, economic or security regional arrangements (the EU, but also NATO), so that terrorists cannot exploit the legal loopholes of one country to prepare their attacks against targets in another country. Furthermore, through international cooperation under the BTWC and the CWC the EU can set up or support programmes to assist parties to the conventions on Europe's periphery in drafting adequate national legislation if they so request.

EU countries participate actively in the implementation of the CWC. At each of the Conferences of the States Parties (which is the highest decision-making body of the OPCW) and at the First Review Conference (April–May 2003), the Presidency has delivered a common statement on behalf of all EU members and associated states. Efforts to strengthen the BTWC are now stalled. The EU members, which during the negotiation increasingly worked together on common positions, have always expressed a strong

interest in adding verification and compliance provisions to the convention. They may therefore take initiatives to relaunch multi-lateral negotiations based on new concepts and approaches to increase the effectiveness of the BTWC. This is not unimportant, as the global norm embedded in the BTWC forms the common standard for all national initiatives to prevent the use of disease as a weapon.

Generic measures to counter the CBW threat

The chances that EU member states might be attacked by another state with CBW are remote. The greatest risk potential exists for European peacekeeping forces operating in different parts of the world, and some specific measures are discussed in the next section. Independent European threat analysis (see also below) and policy development should include relevant weighting factors, as the states near the Mediterranean are arguably more exposed to proliferation threats than the West European or Nordic countries. Mechanisms for EU-wide solidarity between less and more threatened members, which may include specific offers for emergency assistance and help to improve preparedness, could be studied.

In the light of the chemical and biological attacks by Aum Shinrikyo in the mid-1990s, the indiscriminate terrorist strikes executed by al-Qaeda operatives in the United States, Africa and Asia, and mail-delivered anthrax spores, the possibility of similar events occurring inside the European Union can no longer be discounted. The evidence found in January 2003 suggesting the manufacture of ricin in a London flat and the need to deal with the many anthrax letter hoaxes in Europe underscore the need for EU members to take the threat seriously. However, when faced with the threat posed by CB terrorism, the range of possibilities is bewilderingly wide. It becomes immediately evident that no government can prepare to deal with all contingencies. The measures to be taken in order to prevent acts of terrorism, protect the population and infrastructure and deal with the consequences of a terrorist incident must be designed and executed in such a way that they cause the least disruption to economic and social activities and do not diminish the fundamental organising principles of a society. While it is necessary for policy-makers to sufficiently prioritise the threats posed by CB terrorism, it is equally important not to excessively dramatise the threat and especially the

consequences of hypothetical events. A range of generic measures that bolster the existing health and emergency infrastructure and procedures may go a long way towards dealing with such threats. Rather than disrupting the respective societies, they may actually be beneficial.

Among such measures are investments in the health infrastructure so that there is a good regional distribution of emergency wards and a spare capacity of beds. Furthermore, it may be sound policy to fund the establishment of an adequate number of specialised laboratories in geographically distributed hospitals for rapid identification of toxicants and rare pathogens in order to be able to rapidly give first responders and other emergency personnel information about the nature of the contamination or infection. Annual refresher and training courses for doctors and other medical staff can be used to familiarise them with unusual diseases in order to improve their ability to make rapid and accurate diagnoses.

Other important investments are in areas of compatible communications technologies for the different emergency services and adequate field detection and diagnostic equipment for the civil emergency units, and the creation of adequate supplies of medication and equipment. Regular, realistic exercises must be conducted in order to test and improve procedures and equipment.

Specific measures to counter the CBW threat

With regard to possible deployment of EU peacekeeping troops abroad, it would be necessary to equip and train military units to operate in CBW contaminated environments. In particular, integrated forces would require common standards and procedures. Their development could be coordinated with those for NATO troops.

Other specific requirements include the stockpiling of antidotes and pretreatments against chemical warfare agents, and of vaccines and medication against biological warfare agents for both military and civilian use.

Before there is a serious incident – especially one involving a highly contagious pathogen – government authorities should identify the priority services and personnel who should have access to pretreatments and medication. These groups of people

extend beyond the obvious categories of first responders, medical staff, and police forces. In the just-in-time economies of advanced industrialised states, personnel responsible for energy supply, food distribution, and so on, are equally vital to prevent the collapse of a functioning society. Such an assessment should be based on a careful analysis of the functioning of critical infrastructure and integration of services in EU member states.

For the civilian authorities it is equally important to realise that the military standards for chemical and biological decontamination differ fundamentally from those required in a civilian setting. Military standards for decontamination are governed by operational necessity on the battlefield, and in certain circumstances military commanders have to accept chemical or biological casualties. There is no such tolerance for casualties in civil society. However, if the civilian standards are set at unnecessarily low levels or, worse, no commonly accepted levels have been adopted, then the normalisation of activities will be considerably delayed and cause more social disruption and economic losses than the actual terrorist attack.³⁶

Independent assessment capabilities

As was noted in the proliferation section, the assessment of the CBW threat may differ considerably depending on the geopolitical role a state sees for itself, its geographical location and the analytical parameters its agencies use. Most of the public assessments come from the United States, and they serve both the domestic and foreign policy goals of US administrations.

European threat assessments may differ considerably from the US ones.³⁷ It is too simplistic to suggest that current threat assessments by European governments are guided solely by the acceptance or rejection of US appraisals. However, EU member states generally favour less confrontational solutions than the United States, such as diplomatic engagement, and they are far less likely to find themselves involved in military operations in regions of proliferation concern. In order to be able to support its policy strategies, it is imperative that the EU develops its independent intelligence capabilities and interprets the data in accordance with European security needs. Moreover, it needs to adopt common standards and criteria for interpreting risk and threat data so

36. For example, the lack of consensus about what constitutes a safe environment after decontamination is a major contributing factor to the ongoing closure of the Brentwood Mail Processing and Distribution Center in Washington, DC two years after the letters filled with anthrax spores passed through its mail sorting machines.

37. The US–European stand-off in the UN Security Council regarding the military intervention in Iraq early in 2003 was based largely on fundamentally different assessments of the threat posed by Iraq's unconventional weapons and its preparedness to cooperate with UN inspectors.

that the analyses are acceptable to all member states irrespective of their geographical location within the EU.

A need thus exists for a central agency for policy advice and communication of security risks in order to avoid conflicting and confusing statements from individual governments or other sources. Furthermore, the European public and elected representatives will only support European security policies if they see and understand that these security policies are based on independent assessments of the threat. To this end it is imperative that an unclassified report of the EU's intelligence assessments be published and publicly discussed, for example, as part of an annual briefing to the European Parliament.

There is a second dimension to the development of independent assessment capabilities, namely disease surveillance and the rapid determination of whether an outbreak is natural or deliberate. As described in the section on EU policy development after September 2001, this is arguably the area in which the EU has made its greatest advances so far. It falls neatly within one of its key areas of competence, namely public health, and the EU can draw on an existing disease surveillance infrastructure and procedures. However, it should be noted that the current EU efforts are essentially focused on human health security, and that the whole area of animal health security is not yet considered in the context of BW terrorism. Many animal and plant pathogens pose no direct threats to humans, and therefore their manipulation by even individual terrorists can cause enormous agricultural and economic damage (as is evidenced by outbreaks of foot and mouth disease, swine fever, etc.). Furthermore, if transboundary zoonotic diseases were to be considered, it would be quite possible to target humans indirectly through the food chain. As a forthcoming study concludes, the current armoury of measures to counter BW proliferation and terrorism may be insufficient to deal with the threat posed by transboundary zoonotic diseases. In particular, transnational criminal syndicates could pose a serious threat to the public health of EU members, with indirect but possibly intense consequences for the economy. In particular, the weak disease surveillance infrastructure and procedures in the EU candidate states – a transitory period after their joining the EU to come up to EU standards is envisaged – is seen as an Achilles heel of current EU biosecurity policies.³⁸

38. J. Dekker-Bellamy, 'Evaluating Candidate State Compliance with EU Biosecurity Regulations', *Occasional Paper*, no. 2 (Geneva: BioWeapons Prevention Project, 2003), forthcoming.

Training and simulation

Training of emergency responders and troops has already been referred to in the sections dealing with generic and specific measures to deal with the CBW threat. Simulation exercises and training of crisis response and management are also required at all levels of decision-making and across the multiple agencies that would be involved in a large-scale emergency. They must include local, regional and national politicians, the people responsible for managing and overseeing emergency responses, and the press.

Tabletop exercises for the highest levels of decision-makers focus on overall coordination and communication strategies with the different services and commanders on the scene of incidents. While one-day exercises suffice to test certain components of emergency procedures, there is a need to plan occasional simulations that may last several days to examine the overall integration of these components. Tabletop exercises are complemented by realistic, multiple-day field simulation exercises on the ground. It is imperative that the simulations are carried through to their planned end, even if situations emerge that are unpalatable to democracies (e.g., quarantine measures for humans for highly contagious diseases, and (in real situations) their enforcement by means of lethal force if necessary).

EU members are already conducting such simulations with regard to incidents at nuclear or industrial facilities or major accidents, and exercises in dealing with biological and chemical terrorism can build on this experience. However, industrial disasters like the ones in Seweso (1976) or Bhopal (1984), or the recent outbreak of Severe Acute Respiratory Syndrome (SARS), suggest the need to develop and test the emergency procedures at all levels. Many lessons in this respect can also be learned from the terrorist strikes against the Twin Towers in New York and the Pentagon in Washington, DC on 11 September 2001.

In Europe, with its many small countries, a need exists to run cross-border training exercises whereby the organisation of emergency response procedures among EU members is tested and improved (e.g., by discovering and resolving legal and bureaucratic obstacles preventing emergency and law enforcement or specialised military units from operating on the territory of another EU member). Similarly, the EU-wide technical assistance programmes mentioned above must be tested in practice.

The important point to bear in mind is that the preparation and fine-tuning of procedures takes many years, and these activities should be undertaken sooner than later.

Crisis communication strategies

Crisis communication strategies are designed to enable the public to be informed in a responsible way. They form an integral part of the preparations described in the previous section. Among the measures to be considered are the identification of authoritative sources of information for the public at the national and EU levels and the establishment of procedures to maintain communication even under the gravest of circumstances. Both the national and EU authorities should conclude agreements with different sectors of the press in order to prevent as far as possible wrong or sensationalist reporting that might contribute to panic.

In addition, political authorities and key personnel should receive training in crisis communication. The communication strategies at high-risk industrial facilities and industrial evacuation procedures probably offer a good starting point.

Emergency preparedness of civilians

Most people living in the European Union are not accustomed to living with a permanent existential threat. With the spectre of CB terrorism, the question regarding adequate mental preparedness to deal with catastrophic events arises. The relevance of this question derives from the necessity to prepare European societies to meet the terrorist threat without impinging on democratic freedoms and the mobility of people and goods.

The development of an appropriate policy could start from an analysis of existing procedures in high-risk areas. For example, people in earthquake-prone regions do not live in constant fear. Part of the explanation is mental adaptation to the risk, a process that is assisted by regular earthquake drills in, for example, California and Japan. Similarly, communication with the facility management and familiarisation with emergency procedures help to alleviate the fears of people living near chemical or nuclear plants. While such measures in themselves may be insufficient to prevent casualties (even in large numbers) they will give a sense of comfort and manageability of the threat.

Part of this preparation consists of the communication of realistic threat assessments and the holding of public debates on the threat and proposed measures to counter it. This public outreach may also be one of the responsibilities of the central EU agency referred to earlier.

Conclusions

Over the past decade there has been a perception of an increased CBW threat. The threat of terrorists resorting to biological and chemical agents in particular confronts policy-makers with many imponderables. The identity and motives of the terrorists can differ widely; the perpetrators have a broad range of targets (humans, animals, the food chain, the environment and so on) and instruments (in terms of human, animal and plant pathogens, and toxic substances) to cause casualties or economic and societal disruption. Such attacks have been extremely rare in the past, so history offers little guidance as to what the future may hold.

The debates on policy responses to CB terrorism have mostly revolved around consequence management and pre-emption. The undifferentiated application of the label ‘weapon of mass destruction’ to any type of chemical or biological agent and the concept’s implicit focus on the consequences of the use of such agents conjure up images of mass casualties. The enormity of having to confront such an inevitable catastrophic event – it is not a question of if, but of when – and to prepare for its aftermath feeds misguided assumptions about the state sponsorship of terrorists contemplating such attacks and the necessity to mobilise massive national resources to address the threat and its consequences as if the country is in a state of war. In contrast to these dark visions, all known terrorist attacks with CB agents have produced relatively few casualties and even fewer fatalities.

It is possible for governments and public authorities to take wide-ranging preventive measures against CB terrorism without resorting to mass mobilisation of national resources as if they are waging total war. Such measures are generic and cost-effective. Moreover, they are no dead investments. Society as a whole will benefit greatly from improvements in the health and emergency infrastructure and emergency procedures. These can all be applied

in the event of natural disasters or major industrial accidents (although certain aspects will necessarily be specific to CB terrorism).

The EU is already undertaking a number of emergency measures to respond to the threat of CB terrorism. Nevertheless, the range of measures that must be eventually considered in order to optimise efforts to counter CB terrorism and CBW proliferation is much wider. The EU's initiatives appear to be essentially focused on the health security aspect, but a lot of coordination can also be undertaken in the sphere of political and legal cooperation (especially with regard to the strengthening and implementation of the BTWC and the CWC). Furthermore, many of the concrete efforts must be undertaken on the level of individual member states, without which EU coordination would lose much of its relevance. It is also important for governments and public authorities to realise that counter- and preventive measures must be taken before a CB terrorist incident occurs, and that such preparations take several years to achieve maximal effectiveness. Here is a clear and present responsibility of parliaments and governments.



Burkard Schmitt

The EU Security Strategy has identified the Proliferation of Weapons of Mass Destruction as ‘potentially the greatest threat to our security’. However, the fight against it is not at all a lost cause. This is the main conclusion that can be drawn from this *Chaillot Paper*.

- ▶ In fact, an assessment of the different areas of proliferation allows us to highlight a number of encouraging facts.
 1. The number of active ‘proliferators’ and their technological capabilities remain limited. Existing regimes have thus far been fairly successful in reducing both the scope and the pace of proliferation.
 2. Deproliferation is possible: both Iran’s decision to sign the additional IAEA protocols and Libya’s renunciation of its WMD programmes illustrate that political and economic pressure can work. (Even) states of concern base their decisions on a rational cost-benefit calculation. An effective ‘stick-and-carrot’ policy can – and must – ensure that the benefits of deproliferation outweigh the costs of proliferation.
 3. Lacking sufficient indigenous capabilities, most proliferating states depend on imports from technologically more advanced states to develop their WMD programmes. This is particularly true of missile proliferation, which is mainly based on old Soviet *Scud* technology. With the exception of the DPRK and India, all proliferators need substantial foreign assistance to overcome the so-called ‘*Scud*-barrier’ and solve the technical hurdles for the development of missiles with a range greater than 1,000 km.
 4. The development and use of WMD and their delivery systems necessitate a level of know-how, technical infrastructure and logistics that only state actors have been able to achieve so far. In consequence, there are strong doubts as to

whether terrorist groups can at present produce WMD for large-scale attacks on their own. This is the case for nuclear weapons in particular, but also for biological and chemical weapons. CB terrorism, which is generally perceived as the most probable scenario, can cause major economic and social disruption, but the probability of large-scale attacks causing massive human casualties remains relatively low.

5. The only possibility for terrorist groups would thus be to obtain WMD from proliferating states. However, there has been no proof of such transfers up until now. Moreover, the logic of power and self-interest makes it fairly unlikely that state-actors would provide terrorists with WMD.

All this does not mean that the dangers of proliferation should be underestimated. For the time being, the geographical distance vis-à-vis proliferators limits the direct threat to Europe, but proliferation is closely interrelated to regional conflicts that can easily lead to major international crisis and impact on Europe's security. What is more, it would be irresponsible to build policies on the assumption that state and non-state proliferators could never acquire the ability to threaten Europe directly.

However, there are some good reasons to believe that the threat of WMD proliferation is manageable, provided the international community takes it seriously and acts with determination.

In this context, the EU Strategy against proliferation of WMD adopted in December 2003 is a major step forward. It proves the political will of member states to tackle the threat and to do so in a specific, European way. This specificity is based on a clear preference for multilateral institutions and agreements, the rule of law and the treatment of root causes. This approach seems appropriate if – and only if – the new focus on 'effective multilateralism' and 'preventive engagement' is followed up by concrete, resolute action. If Europe wants to defend multilateralism and treaty-based regimes, it has also a specific responsibility for making them work.

This is not the place either to discuss in detail all aspects of the EU's Non-Proliferation Strategy (see annexe) or to repeat the proposals for action that each author presents at the end of his chapter. However, some elements are worth stressing.

- The limited number of active proliferators and their difficulties in developing their arsenals proves the success of the existing

regimes. The EU should therefore use all means at its disposal to defend and strengthen them. This implies, on the one hand, sticking to declared intentions and implementing the new Strategy one-to-one, and, on the other hand, establishing an open dialogue with the United States, in particular on the compatibility of counter-proliferation and non-proliferation.

- As to missile proliferation, Europe should focus on cutting off technology supply lines. This approach seems promising, in particular because of the high import dependence of most proliferators and the limited number of exporters, namely the DPRK, Russia and China. The principal supplier of 1,000 km-plus missile technology, the DPRK, can potentially be induced by the United States to cut its supply, and Russia and China have both made commitments to enforce their controls more stringently. If these three sources of exports can be staunched, it is quite possible to stop further upwards developments by Iran and possibly by Pakistan. Granted, the EU's possibilities to influence the DPRK are limited, but it could and should discuss the issue seriously with China and Russia and above all offer its assistance in improving their respective export control systems.
- As to nuclear proliferation, the EU should continue to concentrate its efforts on Iran, for the three reasons indicated by Bruno Tertrais: Iran is geographically near Europe, its programme has not yet reached the point of no return, and the EU has the political and economic means to influence Tehran. However, the main driving force behind Iran's nuclear temptations will remain its security concerns, which only the United States can assuage. The EU should therefore include these security concerns in its dialogue with the United States. A second priority for the EU in this field should be to strengthen its financial commitment to threat reduction efforts in Russia. This could reduce considerably the risk that nuclear weapons or materiel find their way to terrorists or states of concern.
- In the area of biological and chemical proliferation, the EU should continue to work towards an effective verification system for the BTWC. As to the threat of a bio-terrorist attack, the main threat lies in economic and social disruption. Given the enormous number of possible targets, Jean-Pascal Zanders is right to stress the importance of generic countermeasures, which can also contribute to a society's overall health and

safety. Protection and prevention are key, but they should not come at a price that undermines Europe's own values.

Even the most active non-proliferation policy will probably not be able to eliminate the risk that chemical, biological, radiological or nuclear material is misused for malicious purposes. Given ongoing technological progress and the increasing spread of technical know-how, the proliferation threat might well become an integral part of an increasingly global "risk society". The challenge is then to manage the threat and the risks it entails in the most effective way.

In a globalised world, international cooperation is the sine qua non for tackling this challenge successfully. In this regard, the transatlantic partnership is key. As the United States and Europe are pursuing the same objectives, their current divergences on the best way to achieve them are highly counter-productive. The only way to reconcile European and American approaches is probably 'for the Europeans to be prepared to back up treaty obligations – ultimately with force, whilst the US has to be prepared to play the rules, even when these do not appear to suit its immediate narrow national goals',¹ – a simple but by no means easy solution.

1. Gerard Quille and Stephen Pullinger, 'The European Union: Tackling the Threat from Weapons of Mass Destruction', Brussels, 20 November 2003, p. 5.

EU strategy against proliferation of weapons of mass destruction

At Thessaloniki, the European Council adopted a Declaration on non-proliferation of Weapons of Mass Destruction. Member States made the commitment, drawing on the Basic Principles already established, to further elaborate before the end of 2003 a coherent EU strategy to address the threat of proliferation, and to continue to develop and implement the Action Plan adopted in June by the Council as a matter of priority.

Delegations will find herewith the draft strategy elaborated to fulfil the commitment taken in Thessaloniki.

Introduction

1. The proliferation of weapons of mass destruction and their means of delivery such as ballistic missiles are a growing threat to international peace and security. While the international treaty regimes and export controls arrangements have slowed the spread of WMD and delivery systems, a number of states have sought or are seeking to develop such weapons. The risk that terrorists will acquire chemical, biological, radiological or fissile materials and their means of delivery adds a new critical dimension to this threat.

2. As the European Security Strategy makes clear, the European Union cannot ignore these dangers. WMD and missile proliferation puts at risk the security of our states, our peoples and our interests around the world. Meeting this challenge must be a central element in the EU's external action. The EU must act with resolve, using all instruments and policies at its disposal. Our objective is to prevent, deter, halt and, where possible, eliminate proliferation programmes of concern worldwide.

3. Non-proliferation, disarmament and arms control can make an essential contribution in the global fight against terrorism by reducing the risk of non state actors gaining access to weapons of mass destruction, radioactive materials, and means of delivery. We recall in this context the Council conclusions of 10 December 2001 on implications of the terrorist threat on the non-proliferation, disarmament, and arms control policy of the EU.

Chapter I

Proliferation of WMD and means of delivery is a growing threat to international peace and security

4. The proliferation of weapons of mass destruction and their means of delivery are a growing threat. Proliferation is driven by a small number of countries and non-state actors, but presents a real threat through the spread of technologies and information and because proliferating countries may help one another. These developments take place outside the current control regime.
5. Increasingly widespread proliferation of weapons of mass destruction increases the risk of their use by States (as shown by the Iran/Iraq conflict) and of their acquisition by terrorist groups who could conduct actions aimed at causing large-scale death and destruction.
6. Nuclear weapons proliferation: the Treaty on the Non-proliferation of Nuclear Weapons (NPT) must be preserved in its integrity. It has helped to slow and in some cases reverse the spread of military nuclear capability, but it has not been able to prevent it completely. The possession of nuclear weapons by States outside the NPT and non-compliance with the Treaty's provisions by states party to the Treaty, risk undermining non-proliferation and disarmament efforts.
7. Chemical Weapons Proliferation: A particular difficulty with verification and export control regimes is that the materials, equipment, and know-how are dual use. One way of assessing the level of risk is to see whether there is indigenous ability to produce chemical warfare (CW) agent precursors and to weaponise chemical warfare agents. In addition, several countries still possess large chemical weapons stockpiles that should be destroyed, as provided for in the Chemical Weapons Convention. The possible existence of chemical weapons in States not party to the Chemical Weapons Convention is also a matter of concern.
8. Biological weapons proliferation: although effective deployment of biological weapons requires specialised scientific knowledge including the acquisition of agents for effective dissemination, the potential for the misuse of

the dual-use technology and knowledge is increasing as a result of rapid developments in the life sciences. Biological weapons are particularly difficult to defend against (due to their lack of signature). Moreover, the consequence of the use may be difficult to contain depending on the agent used and whether humans, animals, or plants are the targets. They may have particular attractions for terrorists. Biological weapons, as well as chemical weapons, pose a special threat in this respect.

9. Proliferation of means of delivery related to weapons of mass destruction: development by several countries of concern of ballistic programmes, of autonomous capacity in the production of medium and long range missiles, as well as cruise missiles and UAV are a growing cause of concern.

10. All such weapons could directly or indirectly threaten the European Union and its wider interests. A WMD attack on the EU's territory would involve the risk of disruption on a massive scale, in addition to grave immediate consequences in terms of destruction and casualties. In particular, the possibility of WMD being used by terrorists present a direct and growing threat to our societies in this respect.

11. In areas of tension where there are WMD programmes, European interests are potentially under threat, either through conventional conflicts between States or through terrorist attacks. In those regions, expatriate communities, stationed and deployed troops (bases or external operations), and economic interests (natural resources, investments, export markets) can be affected, whether or not specially targeted.

12. All the States of the Union and the EU institutions have a collective responsibility for preventing these risks by actively contributing to the fight against proliferation.

13. The EU Situation Centre has prepared and will continuously update a threat assessment using all available sources; we will keep this issue under review and continue to support this process, in particular by enhancing our co-operation.

Chapter II

*The European Union cannot ignore these dangers.
It must seek an effective multilateralist response to this threat.*

14. To address with unceasing determination the threat posed by WMD a broad approach covering a wide spectrum of actions is needed. Our approach will be guided by:

- our conviction that a multilateralist approach to security, including disarmament and non-proliferation, provides the best way to maintain international order and hence our commitment to uphold, implement and strengthen the multilateral disarmament and non-proliferation treaties and agreements;
- our conviction that non-proliferation should be mainstreamed in our overall policies, drawing upon all resources and instruments available to the Union;
- our determination to support the multilateral institutions charged respectively with verification and upholding of compliance with these treaties;
- our view that increased efforts are needed to enhance consequence management capabilities and improve coordination;
- our commitment to strong national and internationally-coordinated export controls;
- our conviction that the EU in pursuing effective non-proliferation should be forceful and inclusive and needs to actively contribute to international stability;
- our commitment to co-operate with the United States and other partners who share our objectives.

At the same time, the EU will continue to address the root causes of instability including through pursuing and enhancing its efforts in the areas of political conflicts, development assistance, reduction of poverty and promotion of human rights.

15. Political and diplomatic preventative measures (multilateral treaties and export control regimes) and resort to the competent international organisations form the first line of defence against proliferation. When these measures (including political dialogue and diplomatic pressure) have failed, coercive measures under Chapter VII of the UN Charter and international law (sanctions, selective or global, interceptions of shipments and, as appropriate, the use of force) could be envisioned. The UN Security Council should play a central role.

A) *Effective multilateralism is the cornerstone of the European strategy for combating proliferation of WMD*

16. The EU is committed to the multilateral treaty system, which provides the legal and normative basis for all non-proliferation efforts. The EU policy is to pursue the implementation and universalisation of the existing disarmament and non-proliferation norms. To that end, we will pursue the universalisation of the NPT, the IAEA Safeguard agreements and protocols additional to them, the CWC, the BTWC, the HCOC, and the early entry into force of the CTBT. The EU policy is to work towards the bans on biological and chemical weapons being declared universally binding rules of international law. The EU policy is to pursue an international agreement on the prohibition of the production of fissile material for nuclear weapons or other nuclear explosive devices. The EU will assist third countries in the fulfilment of their obligations under multilateral conventions and regimes.

17. If the multilateral treaty regime is to remain credible it must be made more effective. The EU will place particular emphasis on a policy of reinforcing compliance with the multilateral treaty regime. Such a policy must be geared towards enhancing the detectability of significant violations and strengthening enforcement of the prohibitions and norms established by the multilateral treaty regime, including by providing for criminalisation of violations committed under the jurisdiction or control of a State. The role of the UN Security Council, as the final arbiter on the consequence of non-compliance – as foreseen in multilateral regimes – needs to be effectively strengthened.

18. To ensure effective detectability of violations and to deter non-compliance the EU will make best use of, and seek improvements to, existing verification mechanisms and systems. It will also support the establishment of additional international verification instruments and, if necessary, the use of non-routine inspections under international control beyond facilities declared under existing treaty regimes. The EU is prepared to enhance, as appropriate, its political, financial and technical support for agencies in charge of verification.

19. The EU is committed to strengthening export control policies and practices within its borders and beyond, in co-ordination with partners. The EU will work towards improving the existing export control mechanisms. It will advocate adherence to effective export control criteria by countries outside the existing regimes and arrangements.

B) Promotion of a stable international and regional environment is a condition for the fight against proliferation of WMD

20. The EU is determined to play a part in addressing the problems of regional instability and insecurity and the situations of conflict which lie behind many weapons programmes, recognising that instability does not occur in a vacuum. The best solution to the problem of proliferation of WMD is that countries should no longer feel they need them. If possible, political solutions should be found to the problems, which lead them to seek WMD. The more secure countries feel, the more likely they are to abandon programmes: disarmament measures can lead to a virtuous circle just as weapons programmes can lead to an arms race.

21. To this end, the EU will foster regional security arrangements and regional arms control and disarmament processes. The EU's dialogue with the countries concerned should take account of the fact that in many cases they have real and legitimate security concerns, with the clear understanding that there can never be any justification for the proliferation of WMD. The EU will encourage these countries to renounce the use of technology and facilities that might cause a particular risk of proliferation. The EU will expand co-operative threat reduction activities and assistance programmes.

22. The EU believes that political solutions to all of the different problems, fears and ambitions of countries in the most dangerous regions for proliferation will not be easy to achieve in the short run. Our policy is therefore to prevent, deter, halt and, where possible, eliminate proliferation programmes of concern, while dealing with their underlying causes.

23. Positive and negative security assurances can play an important role: they can serve both as an incentive to forego the acquisition of WMD and as a deterrent. The EU will promote further consideration of security assurances.

24. Proliferation of WMD is a global threat, which requires a global approach. However, as security in Europe is closely linked to security and stability in the Mediterranean, we should pay particular attention to the issue of proliferation in the Mediterranean area.

C) *Close co-operation with key partners is crucial for the success of the global fight against proliferation*

25. A common approach and co-operation with key partners is essential in order to effectively implement WMD non-proliferation regime.

26. Co-operation with the US and other key partners such as the Russian Federation, Japan and Canada is necessary to ensure a successful outcome of the global fight against proliferation.

27. In order to tackle and limit the proliferation risk resulting from weaknesses in the administrative or institutional organisation of some countries, the EU should encourage them to be partners in the fight against proliferation, by offering a programme aimed at assisting these countries in improving their procedures, including the enactment and enforcement of implementing penal legislation. Assistance should be associated with regular joint evaluations, reinforcing the collaborative spirit and the confidence building.

28. Appropriate cooperation with the UN and other international organisations will assist in ensuring a successful outcome of the global fight against proliferation. The EU will ensure, in particular, exchange of information and analysis with NATO, within the agreed framework arrangements.

Chapter III

The European Union must make use of all its instruments to prevent, deter, halt, and if possible eliminate proliferation programmes that cause concern at global level.

29. The elements of the EU's Strategy against proliferation of weapons of mass destruction need to be integrated across the board. We have a wide range of instruments available: multilateral treaties and verification mechanisms;

national and internationally-coordinated export controls; cooperative threat reduction programmes; political and economic levers (including trade and development policies); interdiction of illegal procurement activities and, as a last resort, coercive measures in accordance with the UN Charter. While all are necessary, none is sufficient in itself. We need to strengthen them across the board, and deploy those that are most effective in each case. The European Union has special strengths and experience to bring to this collective effort. It is important that the EU's objectives, as set out in this strategy, be factored in its policy approach in each area, so as to maximise its effectiveness.

30. In implementing our strategy we have decided to focus in particular on the specific measures contained in this chapter. It is a "living action plan" whose implementation will be constantly monitored. It will be subjected to regular revision and updating every six months.

A) Rendering multilateralism more effective by acting resolutely against proliferators.

1) *Working for the universalisation and when necessary strengthening of the main treaties, agreements and verification arrangements on disarmament and non-proliferation.*

■ Carrying out diplomatic action to promote the universalisation and reinforcement of multilateral agreements, in implementation of the Council Common Position of 17 November 2003.

2) *Fostering the role of the UN Security Council, and enhancing expertise in meeting the challenge of proliferation.*

■ Working inter alia to enable the Security Council to benefit from independent expertise and a pool of readily available competence, in order to carry out the verification of proliferating activities that are a potential threat to international peace and security. The EU will consider how the unique verification and inspection experience of UNMOVIC could be retained and utilised, for example by setting up a roster of experts.

3) *Enhancing political, financial and technical support to verification regimes.*

■ Now that all EU Member States have ratified the IAEA Additional Protocols, the EU will redouble its efforts to promote their conclusions by third States.
- Fostering measures aimed at ensuring that any possible misuse of civilian programmes for military purposes will be effectively excluded.

- Releasing financial resources to support specific projects conducted by multilateral institutions (i.a. IAEA, CTBTO Preparatory Commission and OPCW) which could assist in fulfilling our objectives.
 - Promoting challenge inspections in the framework of the Chemical Weapons Convention and beyond. This issue will be addressed in the CWC competent bodies as well as in the framework of political dialogue with third States.
 - Reinforcing the BTWC and the CWC and, in this context, continuing the reflection on verification instruments. The BTWC does not contain at present a verification mechanism. The EU must find ways to strengthen compliance. A group of experts to give advice on how this could be done could be established. The EU will take the lead in efforts to strengthen regulations on trade with material that can be used for the production of biological weapons. The EU will also take the lead in supporting national implementation of the BTWC (e.g. in providing technical assistance). The EU will consider giving support to states with administrative or financial difficulties in their national implementation of the Chemical Weapons Convention and the BTWC.
- 4) *Strengthening export control policies and practices in co-ordination with partners of the export control regimes; advocating, where applicable, adherence to effective export control criteria by countries outside the existing regimes and arrangements; strengthening suppliers regimes and European co-ordination in this area.*
- Making the EU a leading co-operative player in the export control regimes by coordinating EU positions within the different regimes, supporting the membership of acceding countries and where appropriate involvement of the Commission, promoting a catch-all clause in the regimes, where it is not already agreed, as well as strengthening the information exchange, in particular with respect to sensitive destinations, sensitive end-users and procurement patterns.
 - Reinforcing the efficiency of export control in an enlarged Europe, and successfully conducting a Peer Review to disseminate good practices by taking special account of the challenges of the forthcoming enlargement.
 - Setting up a programme of assistance to States in need of technical knowledge in the field of export control.
 - Working to ensure that the Nuclear Suppliers Group make the export of controlled nuclear and nuclear related items and technology conditional on ratifying and implementing the Additional Protocol.
 - Promoting in the regimes reinforced export controls with respect to intangible transfers of dual-use technology, as well as effective measures relating to brokering and transshipment issues.

- Enhancing information exchange between Member States. Considering exchange of information between the EU SitCen and like-minded countries.
- 5) *Enhancing the security of proliferation-sensitive materials, equipment and expertise in the European Union against unauthorised access and risks of diversion.*
- Improving the control of high activity radioactive sources. After the adoption of the Council Directive on the control of high activity sealed radioactive sources, Member States should ensure its fast implementation at national level. The EU should promote the adoption of similar provisions by third countries.
 - Enhancing, where appropriate, the physical protection of nuclear materials and facilities, including obsolete reactors and their spent fuel.
 - Strengthening of EC and national legislation and control over pathogenic microorganisms and toxins (both in Member States and in Acceding Countries) where necessary. Co-operation between the public health, occupational health and safety and the non-proliferation structures should be reinforced. The creation of an EU Centre for Disease Control and the task that it would perform should be analysed.
 - Fostering the dialogue with industry to reinforce awareness. An initiative will be taken in order to promote firstly a dialogue with EU industry with a view to raising the level of awareness of problems related to the WMD and secondly, a dialogue between EU and US industry, in particular in the biological sector.
- 6) *Strengthening identification, control and interception of illegal trafficking.*
- Adoption by Member States of common policies related to criminal sanctions for illegal export, brokering and smuggling of WMD-related material.
 - Considering measures aimed at controlling the transit and transshipment of sensitive materials.
 - Supporting international initiatives aimed at the identification, control and interception of illegal shipments.
- B) *Promoting a stable international and regional environment*
- 1) *Reinforcing EU co-operative threat reduction programmes with other countries, targeted at support for disarmament, control and security of sensitive materials, facilities and expertise.*
- Prolonging the Programme on disarmament and non-proliferation in the Russian Federation beyond June 2004.

- Increasing EU co-operative threat reduction funding in the light of financial perspectives beyond 2006. The creation of a specific Community budget line for nonproliferation and disarmament of WMD should be envisaged. Member States should be encouraged to contribute also on a national basis. These efforts should include measures aimed at reinforcing the control of the non-proliferation of WMD related expertise, science and technology.
 - Setting up of a programme of assistance to States in need of technical knowledge in order to ensure the security and control of sensitive material, facilities and expertise.
- 2) *Integrate the WMD non-proliferation concerns into the EU's political, diplomatic and economic activities and programmes, aiming at the greatest effectiveness.*
- Mainstreaming non-proliferation policies into the EU's wider relations with third countries, in accordance to the GAERC conclusions of 17 November 2003, inter alia by introducing the non-proliferation clause in agreements with third countries.
 - Increasing Union efforts to resolve regional conflicts by using all the instruments available to it, notably within the framework of CFSP and ESDP.

C) *Co-operating closely with the United States and other key partners.*

- 1) *Ensuring adequate follow up to the EU-US declaration on non-proliferation issued at the June 2003 summit.*
- 2) *Ensuring coordination and, where appropriate, joint initiatives with other key partners.*

D) *Developing the necessary structures within the Union*

- 1) *Organising a six monthly debate on the implementation of the EU Strategy at the External Relations Council.*
- 2) *Setting up, as agreed in Thessaloniki, a unit which would function as a monitoring centre, entrusted with the monitoring of the consistent implementation of the EU Strategy and the collection of information and intelligence, in liaison with the Situation Centre. This monitoring centre would be set up at the Council Secretariat and fully associate the Commission.*

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Abbreviations

ASCM	Anti-Ship Cruise Missile
BICHAT	Biological and Chemical Attacks and Threats
BMD	Ballistic Missile Defence
BW	Biological Weapon(s)
BWC	Biological and Toxin Weapons Convention (also BTWC)
CB	Chemical and Biological
CBDP	Chemical and Biological Defense Program
CBW	Chemical and Biological Weapons
CFSP	Common Foreign and Security Policy
CIA	Central Intelligence Agency
CODUN	Council working group on Global Disarmament and Arms Control
CONOP	Committee on Non-Proliferation
CTBT	Comprehensive Test Ban Treaty
CW	Chemical Weapon(s)
CWC	Chemical Weapons Convention
DPRK	Democratic People's Republic of Korea (North Korea)
EU	European Union
EURATOM	European Atomic Energy Community
FMCT	Fissile Material Cut-off Treaty
G-8	Group of Eight leading industrialised nations
GAO	General Accounting Office
GPC	General Purpose Criteria
GPS	Global Positioning System
HcoC	Hague Code of Conduct Against Ballistic Missile Proliferation
HSC	Health Security Committee
IAEA	International Atomic Energy Agency
KEDO	Korean peninsula Energy Development Organisation
LACM	Land Attack Cruise Missile
MTCR	Missile Technology Control Regime
MW	Megawatt
NATO	North Atlantic Treaty Organisation
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
OPCW	Office for the Prohibition of Chemical Weapons
PGM	Precision-Guided Munition
PLN	Pre-Launch Notification
PSI	Proliferation Security Initiative
Pu	Plutonium
RAS	Rapid Alert System
SARS	Severe Acute Respiratory Syndrome
SLV	Space Launch Vehicle
U	Uranium
UN	United Nations
US	United States
USSR	Union of Soviet Socialist Republics
WEU	Western European Union
WMD	Weapons of Mass Destruction

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Since the terrorist attacks of 11 September 2001 and the war in Iraq, the proliferation of weapons of mass destruction has become a top priority for European policymakers. According to the European Security Strategy, it is potentially the greatest threat to the EU's security, in particular if it is linked to terrorism. Recent events in Iraq, North Korea and Iran have confirmed the importance of WMD non-proliferation strategies for international security.

The EU Institute for Security Studies invited three European experts on proliferation to present their views on this issue. In this *Chaillot Paper*, they provide a detailed assessment of the current state of nuclear, biological, chemical and missile proliferation. In addition, they give an analysis of existing non-proliferation tools and develop, for each area, concrete proposals for effective political action.

The findings of this report confirm that WMD proliferation is a serious threat, but that it can be managed successfully if the international community follows up on its declared intentions. In this context, the EU has a crucial role to play, and its recently adopted non-proliferation strategy is an important step in the right direction.

The authors treat proliferation as a global issue, but develop their assessments and proposals with a specific focus on the EU. The aim of this paper is to contribute to the overall European policy debate on Europe's current and future actions in the fight against proliferation.

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