

6. Transparency in the arms life cycle

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I. Introduction

This chapter considers how transparent, on a global scale, the arms life cycle ‘from development to destruction’ is. Transparency is basically understood to mean the release of information by those who possess it: in this case primarily governments. However, information may be shared just to aid coordination between different parts of a government or to help cooperation and build confidence between states, thus keeping the information flow within the official sector. This chapter argues that intra- and inter-government openness is not sufficient for transparency in the arms life cycle. What is of interest is transparency that goes beyond the government sector to provide information—and the opportunity to process and analyse it—to representative institutions, the media and the public at large.¹ Such openness is widely and correctly seen as a prerequisite for democratic control and for the accountability of government actions at national and international level.² Alternatively, as formulated by an international non-governmental organization (NGO), ‘accountability is democracy, transparency is security’.³

The value of information for this purpose is not absolute and uniform, but depends on features such as availability (ease of access and timeliness), reliability (confidence in the accuracy and validity of information), comprehensiveness (type, quantity and coverage of information), comparability (over time and between countries) and disaggregation (detail of information).⁴ These

¹ The owners of the information may provide it voluntarily and actively, or it may be accessible under certain conditions on request (e.g., under ‘freedom of information’ legislation or the disclosure of company information during legal proceedings). It should be noted that transparency of the national or international arms acquisition process is not the topic for this chapter.

² In 2004 the US General Accounting Office, after over 80 years, changed its name to the General Accountability Office as it believes that it is important to ‘provide the public with an accurate, fair, and balanced picture of government today’. Walker, D. M., ‘GAO answers the question: what’s in a name?’, *Roll Call*, 19 July 2004, URL <<http://www.gao.gov/about/namechange.html>>.

³ Women’s International League for Peace and Freedom, *The Model Nuclear Inventory: Accountability is Democracy, Transparency is Security* (Reaching Critical Will: New York, N.Y., 2005), URL <<http://www.reachingcriticalwill.org/about/pubs/Inventory.html>>.

⁴ Bauer, S., ‘The Europeanisation of arms export policies and its impact on democratic accountability’, Doctoral thesis, Université libre de Bruxelles and Freie Universität, Berlin, May 2003.

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qualitative criteria are better indicators of the degree of transparency than the mere quantity of information provided, which can result (perhaps deliberately) in overload and make the most important data harder to find.⁵

Information can also take different forms, but this chapter focuses on the availability of quantitative data (figures and statistics) on a global or at least international level. If the information is of good quality in the above senses, this can make possible the tracing of trends over time, international comparison of the scale of national and institutional actions, and the measurement and tracing of resource movements. Thus, military expenditure data measure the national economic burden of the military and can help to track sub-aspects of spending like equipment acquisition. Quantitative data on arms transfers are an indicator of national arms export policies and of national compliance with international arms control agreements, while arms inventories are an indication of military capability. However (and as discussed further below), the provision of 'bare' figures—even when accurate—may tell an incomplete or misleading story. The amount, type and detail of information published at any one time may be seen as the result of a balance between public demands for openness and government demands for secrecy. The relationship between what the authorities supply and what the demanders of information want and need is neither always positive nor linear. For instance, revealing the facts of defence-related actions may not always strengthen international confidence and security,⁶ and the data may be supplied in a deliberately skewed and selective way to suit the supplier's purposes.

A partial remedy for the problem of low government transparency is that it is not only governments that control data. There are three generic sources of data: (a) national sources, including both government and industry, (b) international organizations and (c) civil society actors like academics, NGOs (whether academic, purpose-oriented or lobbying) and the media. The study of the arms life cycle needs data from companies as well as governments, particularly given the increasing multinationalization of production. While some international organizations mainly publish data released by governments—sometimes as a result of an international agreement—other organizations also actively collect information from other sources. The value that can be added to 'raw' or unsatisfactory data by researchers, NGOs and investigative journalists should not be underestimated. Systematic research, by collating and analysing information from different open sources, may provide a more accurate picture and will support better judgement of policy than a government's own offerings would permit. Expert processing can also help the wider public to make use of information that is initially harder to retrieve and understand. It was in this spirit that Robert Neild, SIPRI's first director, designed the first SIPRI Yearbook, in 1969, to provide in one place an account of recent trends in world military expenditure, the state of the technological

⁵ In some countries, information of the types discussed in this chapter may not even be compiled. This suggests that transparency also depends on the quality of the data's structure and organization.

⁶ Florini, A., 'The end of secrecy', eds B. I. Finel and K. M. Lord, *Power and Conflict in the Age of Transparency* (Palgrave: New York, N.Y., 2000), p. 13.

arms race and the success or failure of recent attempts at arms limitation or disarmament.⁷

This chapter covers a broad and multifaceted topic; in doing so, it considers some important quantitative aspects and major data sources without going into great detail. The chapter is organized around four phases of the arms life cycle: military expenditure and arms production including research and development (R&D), discussed in section II; arms transfers, in section III; national arms inventories held and used at any given time, in section IV; and the disposal of arms, in section V. Four questions are addressed. Is quantitative information available? What are its qualitative features? Has there been any notable change in transparency over the years? To what extent can such changes be attributed to policy or demands from the public? Conclusions are given in section VI.

The chapter is a collective SIPRI effort which covers—when relevant and with due regard to their differences—(a) major conventional weapons; (b) nuclear, biological and chemical weapons (weapons of mass destruction, WMD); and (c) small arms and light weapons (SALW). SALW are currently high on the political agenda because of their use in crime and intra-state conflicts as well as the specific control problems compared with major conventional weapons.⁸ The contemporary political importance of major conventional weapons comes second after the perceived threat of WMD,⁹ although the likelihood of actual use of WMD is probably low.

II. Military expenditure and arms production

There are a number of multilateral arms control agreements that impose voluntary or legal restrictions on states' acquisition of particular types of weapon.¹⁰ As the United Nations (UN) Charter allows countries to acquire weapons for national defence, only a few of these agreements aim for the complete abolition of a class of weapons. Almost all countries therefore allocate financial and other resources to the acquisition of weapons.

⁷ Neild, R., 'Preface', *SIPRI Yearbook of World Armaments and Disarmament 1968/69* (Almqvist & Wiksell: Stockholm, 1969), pp. 5–7.

⁸ SALW have, along with conflict, serious diseases, terrorism and transnational crime, been considered as one of the the main new international threats. Krahmman, E. (ed.), *New Threats and New Actors in International Security* (Palgrave Macmillan: New York, N.Y., 2005).

⁹ It may be symptomatic of today's international threat perceptions that major conventional weapons do not attract more attention and concern as a threat to peace. See United Nations, 'A more secure world: our shared responsibility', Report of the High-level Panel on Threats, Challenges and Change, UN documents A/59/565, 4 Dec. 2004, and A/59/565/Corr.1, 6 Dec. 2004, URL <<http://www.un.org/ga/59/documentation/list5.html>>; and the discussion about norms and intentions in the introduction to this volume.

¹⁰ See chapter 12 in this volume; and United Nations, Department for Disarmament Affairs, 'Multi-lateral disarmament and non-proliferation regimes and the role of the United Nations: an evaluation', Occasional Paper no. 8, New York, N.Y., Oct. 2004, URL <<http://disarmament.un.org/ddapublications>>.

Military expenditure¹¹

Military expenditure is the total of financial resources applied by governments to create and maintain the national military (or 'defence') establishment. Two particular issues have recently increased the political importance of and demand for reliable and disaggregated military expenditure data. First, the level of military spending by recipients of development assistance has, since the end of the cold war, become a criterion in economic aid decisions, especially among the donor countries of the Organisation for Economic Co-operation and Development (OECD). Second, the changing character of threats and armed conflict has increased the demand for data on internal security expenditure and the balance between expenditure for internal and external security.¹² However, low reliability and lack of disaggregation of data make it difficult to use the total amounts allocated for, or spent on, the military for either of these purposes. Owing to the secrecy that most governments apply to military matters, large parts of military spending are often hidden in non-military accounts or completely left out of official accounts.

Transparency in government reporting of military expenditure is also complicated by the fact that the UN definition of such expenditure is not always applied in national government accounting. Each country reports according to its own standards and government expenditure data therefore vary with regard to disaggregation and comprehensiveness. Even though most countries, including the major arms producers, publish at least gross figures of their military expenditure, only a few provide disaggregated data. The general lack of such data makes it difficult to assess what a reported figure includes and what it does not. Another difficulty is that expenditure by the arms industry itself for military R&D and arms production is not included in government military expenditure data.

National government sources that provide international data include the Bureau of Verification, Compliance, and Implementation of the US Department of State. It publishes the *World Military Expenditures and Arms Transfers* (WMEAT) reports.¹³ Similarly, the Defence Intelligence Organisation (DIO) of the Australian Department of Defence has since 2000 published *Defence Economic Trends in the Asia-Pacific*, an attempt to provide a unified source for defence budgets in the region.¹⁴ One difficulty with both of these sources is that the figures are based partly on intelligence information. This

¹¹ For an overview of the availability and uses made of military expenditure data over the past 40 years see chapter 7 in this volume.

¹² This aspect was, e.g., taken up in United Nations, Economic Commission for Latin America and the Caribbean (ECLAC), *Methodology for the Comparison of Military Expenditures* (ECLAC: Santiago, July 2005), URL <<http://www.eclac.cl/cgi-bin/getProd.asp?xml=/publicaciones/xml/9/22549/P22549.xml>>. See also Sköns, E., 'Financing security in a global context', *SIPRI Yearbook 2005: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 2005), pp. 285–306.

¹³ US Department of State, *World Military Expenditures and Arms Transfers* website, URL <<http://www.state.gov/t/vci/rls/rpt/wmeat/>>.

¹⁴ Australian Department of Defence, Defence Intelligence Organisation, Product website, URL <<http://www.defence.gov.au/dio/product.html>>.

limits the usefulness of the data for other users as their validity cannot be assessed.

National military expenditure data are published by a number of international organizations, such as the UN and the International Monetary Fund (IMF). The IMF publishes government financial statistics, including gross military expenditure, for most countries in the *Government Finance Statistics Yearbook* (GFSY).¹⁵ In 1981 the UN created a reporting system operated by its Department for Disarmament Affairs (DDA). The DDA collects data from questionnaires sent to governments, but the figures thus obtained are not checked against other sources. Moreover, relatively few member states report data to the DDA in spite of attempts to promote engagement through regional workshops and the creation of a simplified reporting system.¹⁶ The incentive for member countries to report their military spending is low and the UN can apply no sanctions if a country does not report. A country participating in this activity may regard it mainly as a way to receive political recognition for being transparent, not necessarily to establish more or better transparency. The national DDA reports are made available to the public, but there is no compilation or analysis of the data.¹⁷

In order to counter the general lack of transparency, facilitate national and international debate on military expenditure and make available to the public what information is available on national military expenditure, SIPRI collects and presents consistent, systematic and comparable national data.¹⁸ SIPRI includes in its definition of military expenditure spending on personnel, operations and maintenance, procurement including R&D, military construction, and paramilitary forces. One major difference between the IMF data and SIPRI's is that the IMF excludes and SIPRI includes military pensions for retired personnel.¹⁹ It is of conceptual importance for SIPRI to include military pensions as the purpose is to assess the economic burden to society represented by the military, and pensions may constitute a significant part of the resources allocated to the military.²⁰

¹⁵ The IMF's military expenditure data set is analysed and corrected by the IMF staff but is only published in an aggregate form.

¹⁶ See appendix 8D in this volume.

¹⁷ One particular problem concerns the method for comparing expenditures; see appendix 8E in this volume.

¹⁸ As a recent SIPRI study has shown, under certain circumstances it is also possible to obtain previously unpublished national expenditure data, although these are still mostly presented only as total military spending. Omitoogun, W., *Military Expenditure Data in Africa: A Survey of Cameroon, Ethiopia, Ghana, Kenya, Nigerian and Uganda*, SIPRI Research Report no. 17 (Oxford University Press: Oxford, 2003). See also Omitoogun, W. and Hutchful, E. (eds), SIPRI, *Budgeting for the Military Sector in Africa: The Processes and Mechanisms of Control* (Oxford University Press: Oxford, 2006).

¹⁹ European Union, Economic Policy Committee, 'The impact of ageing populations on public finances: overview of analysis carried out at EU level and proposals for a future work programme', Brussels, 22 Oct. 2003, URL <http://europa.eu.int/comm/economy_finance/epc/epc_ageing_en.htm>.

²⁰ Another NGO that publishes military expenditure data is the International Institute for Strategic Studies (IISS) in its annual publication *The Military Balance*. Although the IISS data have good global coverage, there is no transparency with regard to the sources used and so its data share the reliability problems of the WMEAT and DIO publications. International Institute for Strategic Studies, *The Military Balance* (Brassey's: London, 1992–1994; Oxford University Press: Oxford, 1996–2004; Routledge: Abingdon, 2005–).

Research and development

The earliest phase of arms production is R&D. Most government R&D expenditure is allocated to the development of equipment, performed at the company level. There is large variation among countries as to the availability and scope of government R&D data. More detailed figures are available in the United States than in any other country. The Eurostat Internet-based database reports the gross military R&D expenditure of the European Union (EU) member states, Japan and the USA.²¹ Data on R&D expenditure published by the OECD are highly reliable and comparable as they are produced nationally according to common (Frascati) guidelines,²² but they are only as good as the original national data. Even given the best national data it is often difficult or impossible to find systematic and reliable data on government and company funding of military R&D—arms-producing companies seldom break their R&D spending down into civil and military sub-categories. It is generally not possible to distinguish between basic research, applied research, and development, between R&D for specific types of weapons such as SALW, major conventional weapons or WMD, and between military R&D for national and foreign (cooperation and export) purposes.

SIPRI's military expenditure questionnaire sent to governments covers military R&D, primarily to determine if spending on R&D is part of the national definition of military expenditure.²³ However, governments report R&D data irregularly and use different definitions and so the reliability is problematic. There is no publication that includes a systematic compilation, analysis and comparison of the best military R&D data available. The reliability of government military R&D data has become increasingly complicated by the shift in emphasis towards, first, greater use of science and technology for military purposes in the major arms-producing countries and, second, the internationalization of arms production.²⁴

Arms production

Government military expenditure does not define the cost—to governments and companies—of arms production, as noted above. This is instead reflected in the value of military sales from the arms-producing companies. This output is bought by the national armed forces or transferred to other armed forces or foreign organizations (on arms transfers see section III below). The national

²¹ See the data on outlays on civilian and military R&D on the Eurostat website, URL <http://epp.eurostat.cec.eu.int/pls/portal/url/page/SHARED/PER_RESDEV>.

²² Organisation for Economic Co-operation and Development (OECD), *Main Science and Technology Indicators*, 2005/1 edn (OECD: Paris, 2005). See also Hartley, K., 'Defence R&D: data issues', *Defence and Peace Economics* (forthcoming 2006).

²³ See appendix 8D in this volume.

²⁴ See Hagelin, B., 'Science- and technology-based military innovation: the United States and Europe', *SIPRI Yearbook 2004: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 2004), pp. 300–301.

output is therefore not equal to national procurement, which consists of domestic output bought by the national armed forces plus arms imports.²⁵ It has become increasingly difficult to draw a clear line between types of equipment and between civil and military production resources—and thus to define the boundaries of the arms industry itself.²⁶ Not only does the term ‘defence equipment’, commonly used by producer nations, have a more positive political connotation than ‘military equipment’, but the two terms can also be used simultaneously to cover partly different types of equipment. In European arms transfers data there also exists a distinction between ‘war-fighting’ and ‘support’ equipment. The latter includes civilian equipment that may be used for military purposes: ‘dual-use’ equipment. As a consequence, the amount of resources going into arms production is difficult to determine.

Conventional weapons

Although several of the major countries producing conventional weapons publish (on a regular or ad hoc basis) some sort of arms production data,²⁷ the public availability of quantitative, systematic and detailed information about national and company resources devoted to conventional arms production is unsatisfactory. Reliability is difficult to assess, and comparability is difficult to achieve because of the absence of internationally harmonized legal requirements for the national reporting of data on arms production. The comparability of financial data remains a serious and general problem; in addition, a company’s military sales are seldom broken down with regard to type of product or destination (whether domestic or foreign). It can even be difficult to compare the data provided by a single government or company across time. All the major arms-producing companies have websites on which they publish information, but the type, quality and quantity of available arms production data vary widely and are generally insufficient for detailed analysis.²⁸

²⁵ NATO, in its annual publication of the military expenditure of its members, includes a percentage share for expenditure on equipment. North Atlantic Treaty Organization (NATO), ‘NATO–Russia compendium of financial and economic data relating to defence’, Press Release (2005)161, 9 Dec. 2005, URL <<http://www.nato.int/docu/pr/pr2005e.htm>>.

²⁶ See the SIPRI Arms Production Project website, sources and methods section, URL <<http://www.sipri.org/contents/milap/milex/aprod/siprisources.html>>; and chapter 9 in this volume. On the different ways to define the arms industry see Chu, D. S. C. and Waxman, M. C., ‘Shaping the structure of the American defense industry’, eds G. I. Susman and S. O’Keefe, *The Defense Industry in the Post-Cold War Era* (Pergamon Press: Amsterdam, 1998), pp. 36–39. See also Gummett, P and Reppy, J. (eds), *The Relations between Defence and Civil Technologies*, NATO ASI Series, Series D, Behavioural & Social Sciences vol. 46 (Kluwer: Dordrecht, 1988).

²⁷ SIPRI, Arms Production Project, ‘National data on arms production’, URL <http://www.sipri.org/contents/milap/milex/aprod/nat_data.html>.

²⁸ As an illustration of the data problems, the Small Arms Survey uses a sector-oriented approach as a framework for its production analysis because detailed information is lacking. Small Arms Survey, ‘Unpacking production: the small arms industry’, *Small Arms Survey 2005: Weapons at War* (Oxford University Press: Oxford, 2005), URL <http://www.smallarmssurvey.org/publications/yb_2005.htm>, pp. 39–65. Attempts in 2004–2005 by the European Commission to establish procedures for opening the European arms market to more and fair competition may lead to some transparency in regional arms acquisitions under the European Defence Agency. Commission of the European Communities, ‘Defence procurement’, Green Paper, 23 Sep. 2004, URL <http://europa.eu.int/comm/internal_market/public_procurement/dpp_en.htm>; and chapter 9 in this volume.

The majority of arms producers are involved in both 'military' and 'civil' activities. A pronounced trend towards privatization in the major producer countries has resulted in arms production moving from the part of the economy controlled by the government to the private sector.²⁹ The fact that publicly listed companies must disclose general financial data on revenues and profits, for example, to their shareholders results in some public transparency in the form of company reports or filings.³⁰ However, there are no national or internationally harmonized legal requirements that publicly listed companies should disclose detailed information on their arms production activities.³¹ Government-owned arms producers report only to the government or department to which they are attached, and the government may not necessarily convey this information to the public.³²

In 1989 SIPRI established its Arms Production Project.³³ It maintains a database on arms-producing companies and collects data made available by national governments, industry and other open sources. The project reports financial and employment data for the 100 largest arms-producing companies but does not compile information about the types and numbers of conventional weapons produced.³⁴ This gap is partly covered by the SIPRI Arms Transfers Database, which includes the licensed manufacture of major weapons. Other institutes, such as the International Institute for Strategic Studies (IISS), report on national arms inventories, and by combining different sources it is possible to assess the types and numbers of indigenously produced major weapons.³⁵

As the latest addition to global and systematic arms production studies, the Geneva-based Small Arms Survey has reported annually since 1999 on pro-

²⁹ Sköns, E. and Weidacher, R., 'Arms production', *SIPRI Yearbook 2002: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 2002), pp. 341–46.

³⁰ This has become important information for institutions that do not want to invest in arms manufacturing companies. See, e.g., the Campaign Against Arms Trade (CAAT) Clean Investment campaign website, URL <<http://www.caat.org.uk/campaigns/clean-investment.php>>.

³¹ Surry, E., *Transparency in the Arms Industry*, SIPRI Policy Paper no. 12 (SIPRI: Stockholm, Jan. 2006), URL <<http://www.sipri.org/>>.

³² The importance of this lack of transparency is serious not only because of the nature of the products: the arms industry is considered to be one of the most corrupt industrial sectors. Transparency International, 'Transparency International releases new Bribe Payers Index', Press release, Berlin, 14 May 2002, URL <http://www.transparency.org/pressreleases_archive/>. The largest companies are also significant economic forces. The total 2003 revenue of the SIPRI Top 100 arms-producing companies was roughly equal to the combined national output of 61 low-income countries. Sköns, E. and Surry, E., 'Arms production', *SIPRI Yearbook 2005* (note 12), pp. 388–89.

³³ See the SIPRI Programme on Military Expenditure and Arms Production website, URL <<http://www.sipri.org/contents/milap/>>; and chapter 9 in this volume.

³⁴ See appendix 9A in this volume; and Surry (note 31). Data on employment in military companies do not always separate employment in military and civilian production, as many companies are involved in both activities. While variations in employment may reflect changes in military R&D or production, employment figures by themselves do not reflect the type of military production, its volume or sales. For such figures see, e.g., Bonn International Conversion Center (BICC), *Conversion Survey* (Oxford University Press: Oxford, 1996–98; NOMOS Verlagsgesellschaft: Baden-Baden, 1999–).

³⁵ The IISS gives numbers of weapons acquired domestically as well as from abroad. International Institute for Strategic Studies, *The Military Balance 2005–2006* (Routledge: Abingdon, 2005), table 16.

duction and other issues related to SALW as defined by the UN.³⁶ The task is ambitious but difficult as the availability of reliable national data is limited. It was recently concluded that it is impossible even to provide a reliable estimate of the current size of the military SALW industry in Western Europe,³⁷ a region where transparency in conventional weapons is generally relatively high compared to other parts of the world (see below).

Weapons of mass destruction

Four countries are known to have voluntarily discontinued relatively advanced nuclear weapon development or production processes: Argentina, Brazil, South Africa and Sweden.³⁸ Such development and production are difficult to verify owing not least to the dual-use or dual-purpose character of many phases of the production, which uses equipment, technology, materials and know-how that can be applied for both civil and military purposes. Very limited information is available about nuclear weapon production facilities—these facilities are not covered by the safeguards system for the civil nuclear industry monitored by the International Atomic Energy Agency (IAEA). Their sensitive nature and the unwillingness of governments to permit inspection are major impediments to progress towards building transparency in global fissile material production and storage. However, the IAEA maintains comprehensive nuclear-related databases.³⁹

The level and quality of transparency regarding production and possession of chemical weapons are continuing to grow largely because of the implementation of the 1993 Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (Chemical Weapons Convention, CWC). As of March 2006 it had 178 states parties.⁴⁰ The CWC has provisions that allow for informal consultation, clarification and fact-finding that have been successfully used to clarify some (but not all) concerns by some of the parties.⁴¹

There is less transparency in the field of biological weapons and it may be said to be decreasing. This is partly because the 1972 Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological

³⁶ In 2004 it was estimated that there were over 1200 companies in c. 90 countries producing small arms and light weapons. Small Arms Survey, *Small Arms Survey 2004: Rights at Risk* (Oxford University Press: Oxford, 2004).

³⁷ Weidacher, R., *Behind a Veil of Secrecy: Military Small Arms and Light Weapons Production in Western Europe*, Small Arms Survey Occasional Paper no. 16 (Small Arms Survey: Geneva, 2005), URL <<http://www.smallarmssurvey.org/publications/occasional.htm>>, p. 77.

³⁸ Other countries have ended smaller or less developed nuclear weapon programmes, e.g., South Korea and Taiwan. See appendix 13A in this volume for details of the current holders of nuclear forces.

³⁹ See the International Atomic Energy Agency website, URL <<http://www.iaea.org/>>. On nuclear weapon inventories see section IV below.

⁴⁰ The declared chemical weapon possessors are Albania, India, South Korea, Libya, Russia and the USA. See annex A in this volume for lists of signatories and parties to the CWC.

⁴¹ Such concerns involved the completeness of declarations to the Organisation for the Prohibition of Chemical Weapons (OPCW), the body that implements the CWC, on past chemical weapon programmes and current activities being carried out by other parties' national defence establishments as part of programmes permitted by the CWC.

(Biological) and Toxin Weapons and on their Destruction (Biological and Toxin Weapons Convention, BTWC) lacks a standing institutional mechanism to implement the convention and to clarify compliance concerns.⁴² In addition, a 1992 admission by Russia that the Soviet Union had violated the BTWC has since been publicly contradicted by a number of Russian officials, including individuals within the country's defence establishment.⁴³ Finally, the potential for misusing the results of advances in scientific and technological research with dual-purpose applications is continuing to grow.

The most difficult question regarding the nature of work carried out by a state's biological defence establishment is whether the work is part of a defensive programme or is offensive. If it is offensive, then it is prohibited by the BTWC.⁴⁴ However, most, if not all, research and testing short of large-scale production might be justified on the grounds that it is necessary for the evaluation of possible biological weapon threats. The matter is further complicated by a need to protect intelligence sources and methods, by difficulties associated with how such information can be acted on effectively, including within multilateral frameworks, and by ensuring the effectiveness of international prohibitions against non-state actors (i.e., terrorists).

There are suspected but unconfirmed national producers of all three classes of WMD.⁴⁵ A number of NGOs publish information about issues related to the production of all types of WMD—for instance SIPRI—or particular WMD—such as the Nuclear Threat Initiative.⁴⁶ They are all severely constrained in their analysis by the transparency problems.

III. Arms transfers

Since the 1960s governments have developed a number of mechanisms for collecting and releasing information on their arms transfers. These mechanisms can be broadly categorized as including either confidential, multi-national reporting mechanisms (such as the Wassenaar Arrangement⁴⁷), pub-

⁴² On the BTWC see annex A in this volume.

⁴³ 'Statement on 29 January 1992 by B. N. Yeltsin, President of the Russian Federation, on Russia's policy in the field of arms limitations and reduction', Conference on Disarmament document CD/1123, 31 Jan. 1992.

⁴⁴ Roffey, R., 'Biological weapons and potential indicators of offensive biological weapon activities', *SIPRI Yearbook 2004* (note 24), pp. 557–71.

⁴⁵ On suspected nuclear, biological, chemical and ballistic missile weapon programmes see US Department of State, *Adherence to and Compliance with Arms Control, Nonproliferation and Disarmament Agreements and Commitments* (Department of State: Washington, DC, Aug. 2005), URL <<http://www.state.gov/t/vci/rls/rpt/c15720.htm>>.

⁴⁶ See chapters 13 and 14 in this volume; and the Nuclear Threat Initiative website, URL <<http://www.nti.org/>>.

⁴⁷ The Wassenaar Arrangement was established in July 1996 to promote 'transparency and greater responsibility in transfers of conventional arms and dual-use goods and technologies, thus preventing destabilising accumulations'. It replaced the voluntary Coordinating Committee for Multilateral Export Controls (COCOM), established in the 1950s and directed against Communist states. The participants in the Wassenaar Arrangement exchange information in confidence on the export of 7 categories of major conventional weapon to non-participating states. Anthony, I. and Bauer S., 'Transfer controls and destruction programmes', *SIPRI Yearbook 2004* (note 24), pp. 744–47; and Lewis, J. A., 'Multilateral

licly available multinational reporting mechanisms (such as the UN Register of Conventional Arms, UNROCA) and publicly available, unilateral reporting mechanisms (such as the various annual reports on arms exports that governments now produce). The EU Annual Report on the Code of Conduct on Arms Exports began as a confidential exchange between governments but became public after pressure from the European Parliament, NGOs and the 1999 Finnish EU Presidency.⁴⁸

The motivations behind these mechanisms and the types of data collected and distributed vary considerably. In general, however, reliable, systematic and comparable data on arms exports would make it possible to analyse the implementation of national arms export policies and national compliance with international agreements to prevent the spread of specific weapons and related technologies and components, as well as to assess weapon build-ups.⁴⁹ Moreover, like military expenditure figures, data on arms transfers are relevant for making assessments of the impact of arms acquisitions on a recipient country's economy. Under the 1998 EU Code of Conduct, European suppliers are expected to assess the balance between accepting a recipient's legitimate security and self-defence needs and avoiding the diversion of the recipient's human and economic resources.⁵⁰

Missiles—whether cruise, ballistic or anti-ballistic—have become the focus of political concerns because of a change in the nature of armed conflicts, the potential use of missiles as vehicles for WMD, their spread through licensed manufacture as well as deliveries and their potential destabilizing effects.⁵¹ The Missile Technology Control Regime (MTCR), established in 1986, has tried since 1993 to limit the proliferation of any type of missile, unmanned

arms transfer restraint: the limits of cooperation', *Arms Control Today*, vol. 35, no. 9 (Nov. 2005), <http://www.armscontrol.org/act/2005_11/>. See chapter 16 and also the glossary in this volume for a list of participants in the Wassenaar Arrangement.

⁴⁸ Bauer, S. and Bromley, M., *The European Union Code of Conduct on Arms Exports: Improving the Annual Report*, SIPRI Policy Paper no. 8 (SIPRI: Stockholm, Nov. 2004), URL <<http://www.sipri.org/>>, p. 5. It has also been suggested that a change in national arms export policies towards stricter controls and transparency is generally the result of popular demands. Hagelin, B., *Neutrality and Foreign Military Sales* (Westview Press: Boulder, Colo., 1990); and Hagelin, B., *Arm in Arm: Swedish–Australian Military Trade and Cooperation*, Peace Research Centre Monograph no. 15 (Peace Research Centre, Australian National University: Canberra, 1994).

⁴⁹ For an overview see Squassoni, S. A., Bowman, S. R. and Behrens, C. E., 'Proliferation control regimes: background and status', Library of Congress, Congressional Research Service, Washington, DC, 10 Feb. 2005; the latest revision is available at URL <<http://fpc.state.gov/fpc/42407.htm>>.

⁵⁰ Council of the European Union, 'User's guide to the EU Code of Conduct on Arms Exports', Brussels, 14 Oct. 2005, URL <<http://register.consilium.eu.int/pdf/en/05/st13/st13296.en05.pdf>>, pp. 24–28.

⁵¹ Several initiatives have been launched to investigate how best to address the proliferation of ballistic missiles. E.g., in Nov. 2002 over 90 states declared their readiness to subscribe to the Hague Code of Conduct against Ballistic Missile Proliferation. The intention was to address some of the shortcomings of the Missile Technology Control Regime (MTCR) by introducing demand-side policy controls. However, this can only be described as a partial success as several states with missile-development programmes decided not to join the initiative. Ahlström, C., 'Non-proliferation of ballistic missiles: the 2002 Code of Conduct', *SIPRI Yearbook 2003: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 2003), pp. 749–59; and US Department of State, Bureau of Non-proliferation, 'International Code of Conduct against Ballistic Missile Proliferation', Fact sheet, Washington, DC, 6 Jan. 2004, URL <<http://www.state.gov/t/np/rls/fs/27799.htm>>. See the glossary in this volume for a list of participants in the Hague Code of Conduct.

aerial vehicles and any items in the MTCR annex intended for the delivery of WMD (the 'catch-all' clause).⁵² As many such missiles are 'conventional' weapons, much missile proliferation is covered by data on major conventional weapon transfers and thus states' observance of the MTCR can be monitored.

Major conventional weapons

The transfer of major conventional weapons is an area where more systematic and detailed data have become available from governments and NGOs.⁵³ The countries that regularly report on their national arms transfers are mainly in North America and Europe. In the USA two government organizations publish national and global data on arms transfers: the Congress publishes an annual report on transfers to developing nations and the Department of State publishes the WMEAT reports.⁵⁴ These reports use classified sources that reduce the reliability of the data.⁵⁵ In addition, the compilation of long time series is complicated as the data are presented for different periods in subsequent publications. Most EU countries report annually on their arms exports in a standard format, but without a common definition of 'arms exports'. These data are the basis for the public EU Annual Report on the Code of Conduct on Arms Exports.

Among international sources of data on global arms transfers available to the public, the voluntary UNROCA, begun in 1991, is the only official and global register of major arms transfers in the public domain. The EU Annual Report is not global with regard to suppliers since it covers exports from EU members only, but it does include the world's major arms suppliers other than the USA and Russia.⁵⁶ These organizations use different definitions and principles for collecting the data, partly because the purposes of the data sets

⁵² See the Missile Technology Control Regime website, URL <<http://www.mtcr.info/english/>>; Arvidsson, P., 'Small arms and grenade launchers today and in the future', *Swedish Journal of Military Technology*, no. 1, 2005, pp. 17–21; and Fiorenza, N., 'NATO arms conference to focus on terrorist threats to aircraft', *Defense News*, 14 Mar. 2005, p. 13. See chapter 16 and also the glossary in this volume for a list of participants in the MTCR.

⁵³ Depending on the research questions, the need for detailed information on arms transfers may vary. Bauer and Bromley (note 48). See also United Nations, Office for Disarmament Affairs, *Study on Ways and Means of Promoting Transparency in International Transfers of Conventional Arms*, Report of the Secretary-General, Study Series 24, UN document A/46/301 (United Nations: New York, N.Y., 1992); Goldring, N. J., 'Moving toward transparency: an evaluation of the United Nations Register of Conventional Arms', British American Security Information Council (BASIC) Research Report no. 93.6, BASIC, London, Oct. 1993; and United Nations, Department of Disarmament Affairs, 'Transparency in armaments: 10th anniversary of the United Nations Register of Conventional Arms', New York, N.Y., 2002, URL <<http://disarmament2.un.org/cab/Bk1-TransArms.pdf>>.

⁵⁴ Grimmett, R. F., 'Conventional arms transfers to developing nations, 1997–2004', Library of Congress, Congressional Research Service, Washington, DC, Aug. 2005 (updated annually); and US Department of State (note 13),

⁵⁵ For a positive review of the US arms export system see Schroeder, M., 'Transparency and accountability in arms export systems: the United States as a case study', *Disarmament Forum*, no. 3, 2005, URL <http://www.unidir.org/bdd/fiche-article.php?ref_article=2393>, pp. 29–37.

⁵⁶ The combined exports from the 25 current EU member states accounted for 27% of total global exports of major conventional weapons in the period 2001–2005, making the EU the third largest exporter. See chapter 10 in this volume.

differ. The UNROCA was established after the 1991 Gulf War as a confidence-building measure for UN members to avoid destabilizing surprises. The aim of the EU Annual Report is to assist the EU Code of Conduct in its efforts to harmonize the national arms export policies of the EU member states. The increase in publicly available data on arms transfer is, generally, the result of the quality and quantity of national reports produced by EU member states and largely due to pressures exerted by the EU Code of Conduct.

Moreover, the UNROCA is incomplete and inaccurate.⁵⁷ The UN's Advisory Board on Disarmament Matters proposed to the UN High-level Panel on Threats, Challenges and Change that, in order to increase transparency, all members should report completely and accurately on all elements of the UNROCA.⁵⁸ One problem is political: namely, that detailed and correct data about arms imports for countries with no indigenous arms industry, not least in the Middle East, would reveal their arms inventories. Furthermore, the UN Secretary-General should be, but is not, required to report annually to the General Assembly and Security Council on any inadequacies in the reporting. Similarly, EU reporting could be improved.⁵⁹ With regard to the 2001 UN Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All its Aspects, one area that has attracted the least amount of financial and technical assistance is transparency.⁶⁰

The SIPRI Arms Transfers Project systematically analyses open information (both official and unofficial) about transfers of major conventional weapons but excluding most SALW. One result is a 'trend-indicator value' that permits comparisons over time and between countries from 1950.⁶¹ The IISS also publishes international arms transfer data. Until 2005 it published financial data on arms exports; from 2005 the information is organized in a fashion similar to SIPRI's Arms Transfers Register but it differs from the SIPRI information.⁶² As with other IISS data, it is not possible to assess the data's reliability.

The use, and especially the combination, of arms transfer data from different sources is complicated; the UNROCA gives the number of items transferred, while the US and EU reports calculate a financial value. The SIPRI trend-indicator value should not be compared with any of these figures. SIPRI also estimates a financial value of global arms exports from national reports, a task

⁵⁷ Wezeman, S. T., *The Future of the United Nations Register of Conventional Weapons*, SIPRI Policy Paper no. 4 (SIPRI: Stockholm, Aug. 2003), URL <<http://www.sipri.org/>>.

⁵⁸ The reporting request was taken up among the UN High-level Panel's recommendations. United Nations (note 9), Paragraph 97 and Recommendation 16.

⁵⁹ See the recommendations in Bauer and Bromley (note 48), pp. 32–33.

⁶⁰ Kytömäki, E. and Yankey-Wayne, V., 'Executive summary', *Implementing the United Nations Programme of Action on Small Arms and Light Weapons: Analysis of Reports Submitted by States in 2003* (UN Institute for Disarmament Research: Geneva, 2005), pp. xiii–xxii.

⁶¹ See appendix 10C in this volume; and the SIPRI Arms Transfers Project website, URL <<http://www.sipri.org/contents/armstrad/>>.

⁶² International Institute for Strategic Studies (note 20).

complicated by the lack of a common international definition of 'arms exports'.⁶³

Small arms and light weapons

Compared to major weapons, there are many more producers of SALW and there are greater opportunities to hide their transfer. As a consequence, it has been more difficult to compile systematic and reliable data at the global level about SALW transfers, especially since such weapons were not in the past separated from major weapons in national arms transfers reporting. However, as a result of their use in crime, the increase in the number of intra-state conflicts and the specific control problems compared with major conventional weapons, many countries now exchange information on their transfers of SALW. For example, all member states of the Organization for Security and Co-operation in Europe (OSCE) share information on the import and export of SALW to and from other OSCE states under the 2000 Document on Small Arms and Light Weapons.⁶⁴ While most member states share such information in confidence, some governments, including the Czech Republic, Germany and Spain, chose to make their reports public.⁶⁵

There is one NGO that has a systematic focus specifically on issues related to SALW: the Small Arms Survey. It acknowledged in 2003 that its most difficult research task involves the documenting of international transfers, mainly owing to lack of data and coverage.⁶⁶ No national or global series of data are available for small arms transfers, and understanding of the authorized trade remains partial. All global and most national estimates are highly unreliable. In order to overcome this situation, governments need to regularly report on transfers of small arms, light weapons and major weapons in separate categories.⁶⁷

While the SIPRI Arms Transfers Database includes some UN light weapons categories, the Small Arms Survey makes use of the Norwegian Initiative for Small Arms Transfers (NISAT) to compile information on SALW transfers from the UN Commodity Trade Statistics (UN Comtrade) Database⁶⁸ and

⁶³ SIPRI Arms Transfers Project, 'Financial value of arms exports', URL <http://www.sipri.org/contents/armstrad/at_gov_ind_data.html>. See also chapter 10 in this volume.

⁶⁴ Organization for Security and Co-operation in Europe, OSCE Document on Small Arms and Light Weapons, FSC.DOC/1/00, 24 Nov. 2000, URL <<http://www.osce.org/item/16343.html>>.

⁶⁵ Hagelin, B. et al., 'International arms transfers', *SIPRI Yearbook 2003* (note 51), pp. 463–64. In 2003 the Wassenaar states agreed to exchange, in confidence, information on transfers of SALW and man-portable air defence systems (MANPADS). Anthony and Bauer (note 47).

⁶⁶ Small Arms Survey, *Small Arms Survey 2003: Development Denied* (Oxford University Press: Oxford, 2003), p. 5.

⁶⁷ Small Arms Survey (note 28), p. 117. From 2004 the Small Arms Survey has produced the Small Arms Trade Transparency Barometer, which gives points to individual nations according to their official reporting; see URL <<http://www.smallarmssurvey.org/barometer/>>.

⁶⁸ See the UN Commodity Trade Statistics Database website, URL <<http://unstats.un.org/unsd/comtrade/>>. The data are discussed in Small Arms Survey (note 28), pp. 98–100.

national arms export reports.⁶⁹ However, the disaggregation and reliability of customs data in particular is complicated by problems of distinguishing between civil and military goods and between other goods in many of the open customs categories. The ambition of the NISAT database is also to permit an analysis of the illicit trade. However, most states make available very little information on customs seizure of illicit arms.⁷⁰ In 2004 a UN report recommended legally binding agreements on the transfers (as well as the marking, tracing and brokering) of SALW.⁷¹

IV. Arms inventories

As quantitative information seems so precise, it is easily misused. It is not uncommon to see (changes in) a country's military expenditure being cited by governments and others as evidence for the defence capability of that country, of the threat it may present, and even of its intentions. It is particularly tempting to use budget data for such purposes, especially when other criteria of transparency are low.⁷² However, such analysis could support worst-case analysis and increase the risk of mis- or disinformation with potentially serious consequences, as recently seen in the case of Iraq. National military strength, or capability, is not a simple function of financial or other material inputs. 'Bean counting', therefore, does not answer crucial questions about military capability.⁷³

Capability assessments need to consider, among other things, the potential use (and usefulness) of specific parts or all of the operational inventory, including factors such as the technical level of modernization, deployability, mobility and maintenance, the doctrine according to which the weapons are to be used, and the training and motivation of those handling the equipment.⁷⁴

⁶⁹ See the Norwegian Initiative on Small Arms Transfers (NISAT) website, URL <<http://www.prio.no/nisat/>>.

⁷⁰ Small Arms Survey (note 28), p. 117.

⁷¹ United Nations (note 9), Recommendation 15.

⁷² E.g., the US Government is concerned about an increase in Chinese military capabilities and the parallel lack of transparency of its defence budget. US Department of Defense, 'Annual report on the military power of the People's Republic of China, FY04 report to Congress on PRC military power', Washington, DC, 2005, URL <<http://www.defenselink.mil/pubs/d20040528PRC.pdf>>; and 'Eyes on China', *Aviation Week & Space Technology*, 5 Sep. 2005, p. 21. See also chapter 8 in this volume.

⁷³ See, e.g., publications by the former SIPRI Military Technology Project: Arnett, E., 'Iran, threat perception and military confidence-building measures', SIPRI, Stockholm, 1996, URL <http://projects.sipri.org/technology/Iran_CBM.html>; and Arnett, E. (ed.), SIPRI, *Military Capacity and the Risk of War: China, India, Pakistan and Iran* (Oxford University Press: Oxford, 1997). There are several RAND publications on the issue of capability, including Treverton, G. F. and Jones, S. G., *Measuring National Power* (RAND: Santa Monica, Calif., 2005), URL <http://www.rand.org/pubs/conf_proceedings/CF215/>; and Tellis, A. J. et al., *Measuring National Power in the Postindustrial Age* (RAND: Santa Monica, Calif., 2000), URL <http://www.rand.org/pubs/monograph_reports/MR1110/>.

⁷⁴ E.g., in the negotiation of the 1990 Treaty on Conventional Armed Forces in Europe, participants from both sides of the East–West divide, having failed to set more complex parameters for heavy weapons, agreed to a quantitative 'one-for-one' rule in each of the weapon categories. An even more complicated issue was how to define the comparative effectiveness of NATO and Warsaw Treaty Organization soldiers. Eventually, the parties agreed to a politically binding agreement in which each party set a limit on national land personnel. The agreement on personnel strength was signed in 1992 and was

Moreover, not only does military capability vary over time, but it is only relevant to security analysis in relation to the capability of a potential military opponent.⁷⁵ It is difficult to make an objective and accurate assessment of 'military balance' or 'the balance of power'. Today, international armed conflicts are fought abroad rather than in defence of national territory, with allies rather than alone, and do not necessarily define a military opponent in a geographical sense.⁷⁶ The existence of national forces and stocks of weapons abroad as well as the access to foreign bases complicate not only reliable estimates of the size and deployment of national inventories at a particular time, but also the assessment of operational military capability.⁷⁷

Owing to the problems with quantifying the production and trade of SALW (see above), they are not covered in this section. Nor are chemical and biological weapons since there are no publicly proven stockpiles of biological weapons and since detailed inventories of chemical weapon stockpiles among states parties to the CWC are already known.⁷⁸

Conventional weapons

As illustrated above with regard to imports by nations lacking indigenous production capabilities, most countries closely guard the exact information about their arms inventories. There is no officially confirmed or otherwise verifiable figure for the size of all conventional weapon inventories in the world, although the aim of the UNROCA was to achieve transparency in national holdings of the types of major weapons reported. There are, however, organizations that try to quantify and analyse such information from available information—some of it official information—such as the Bonn International Center for Conversion, the IISS, Jane's publications on weapon systems⁷⁹ and

implemented by 1995. The official figures are publicly available. Crawford, D., 'Conventional Armed Forces in Europe (CFE): a review and update of key treaty elements', Arms Control Bureau, US Department of State, Washington, DC, Dec. 2004; and International Institute for Strategic Studies (note 20). Estimates of personnel strength in other countries are published by the US Department of State (note 13), International Institute for Strategic Studies (note 20) and the Bonn International Center for Conversion (note 34).

⁷⁵ The particular problem of arms inventories of non-state actors is illustrated by MANPADS, comparably light weapons which in the hands of well-trained users pose a greater risk than some heavier weapons. Bolkcom, C., Feickert, A. and Elias, B., 'Homeland security: protecting airliners from terrorist missiles', Library of Congress, Congressional Research Service, Washington, DC, Nov. 2003; the latest revision is available at URL <<http://fpc.state.gov/fpc/38031.htm>>.

⁷⁶ Zanini, M. and Taw, J. M., *The Army and Multinational Force Compatibility* (RAND: Santa Monica, Calif., 2000), URL <<http://www.rand.org/publications/MR/MR1154/>>.

⁷⁷ Foreign pre-positioning of weapons is mainly relevant for US forces. Harkavy, R. E., 'Thinking about basing', *Naval War College Review*, vol. 58, no. 3 (summer 2005), pp. 26–27; Cooley, A., 'Base politics', *Foreign Affairs*, vol. 84, no. 6 (Nov./Dec 2005), pp. 79–92; Bonn International Center for Conversion, *Conversion Survey 2005: Global Disarmament, Demilitarization and Demobilization* (Nomos Verlagsgesellschaft: Baden-Baden, 2005), pp. 44–46; and Lachowski, Z., *Foreign Military Bases in the Euro-Asian Region*, SIPRI Policy Paper (SIPRI: Stockholm, forthcoming 2006).

⁷⁸ Even among suspected, undeclared chemical weapon states, none is believed to possess large stockpiles.

⁷⁹ The number of Jane's specialized military equipment publications has increased over time; a list is available at URL <<http://catalog.janes.com/catalog/public/index.cfm?fuseaction=home.ProductIndex>>.

the Small Arms Survey. The reliability of such figures is in most cases controversial. For instance, the IISS claims that the national equipment holdings are based on the most accurate data available or on best estimates as well as judgements based on the available information.⁸⁰

Europe is an exceptional region in that official transparency of certain categories of major conventional weapon inventories is pursued under arms control agreements reached within the framework of the OSCE, until 1995 known as the Conference on Security and Co-operation in Europe. Both the legally binding 1990 Treaty on Conventional Armed Forces in Europe (CFE Treaty), based on the NATO and Warsaw Treaty Organization alliances at the time, and the politically binding Vienna Document 1999 on Confidence- and Security-Building Measures contribute to public openness and transparency of the arsenals of the European states.⁸¹ The 1999 Agreement on the Adaptation of the CFE Treaty has not yet formally entered into force, but its enhanced transparency procedures are already respected.⁸² The historical record of limits and national holdings in five treaty-limited conventional weapons categories—battle tanks, armoured combat vehicles, artillery pieces, combat aircraft and attack helicopters—by 28 countries, including Russian and US holdings in Europe but excluding the neutral European countries, is public information. SIPRI's activity in disseminating this information is an example of how an NGO may act as a 'transparency agent' of an international organization.⁸³

Nuclear weapons

Nothing similar to the CFE Treaty's transparency regime has been achieved in other parts of the world or in other weapon categories. Although there has been some progress made since the late 1960s towards greater transparency in nuclear arsenals, there remain large uncertainties about global inventories of nuclear weapons and weapon-usable fissile material.⁸⁴ The five states defined

⁸⁰ International Institute for Strategic Studies (note 35), p. 6.

⁸¹ For a presentation of the history, negotiations and status of the CFE Treaty see the SIPRI Yearbooks 1991–2005; Lachowski, Z., *Confidence- and Security-Building Measures in the New Europe*, SIPRI Research Report no. 18 (Oxford University Press: Oxford, 2004); and Peters, J. E., *CFE and Military Stability in Europe* (RAND: Santa Monica, Calif., 1997), URL <http://www.rand.org/pubs/monograph_reports/MR911/>. On the Vienna Document 1999 see annex A in this volume.

⁸² Lachowski, Z., 'Conventional arms control', *SIPRI Yearbook 2000: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 2000), pp. 599–600.

⁸³ The CFE weapon ceilings and holdings are available on SIPRI's Facts on International Relations and Security Trends (FIRST) website, URL <<http://first.sipri.org/>>. SIPRI plays the role of a conduit for OSCE information to the public. The publication of OSCE information and data must not exceed the limits beyond which sensitive information and the security interests of states concerned might be compromised. Thus, e.g., SIPRI does not publish details about the location or deployments of weapons provided under the CFE and Vienna Document regimes. See also Lachowski, Z. and Sjögren, M., 'Conventional arms control', *SIPRI Yearbook 2004* (note 24), p. 714.

⁸⁴ The negotiations about a prospective fissile material cut-off treaty remains stalled in the Conference on Disarmament in Geneva in part because of a dispute about the adequacy of verification arrangements. Carlson, J., 'Can a fissile material cut-off treaty be effectively verified?', *Arms Control Today*, vol. 35, no. 1 (Jan./Feb. 2005), pp. 25–29.

as nuclear weapon states by the 1968 NPT—China, France, Russia, the United Kingdom and the USA—publish some official data about their nuclear forces in different national sources. In addition, considerable official information about US nuclear forces has been declassified and made public through the USA's Freedom of Information Act.⁸⁵ However, the reliability and comprehensiveness of official information about the force holdings of the five NPT-defined nuclear weapon states varies and is especially limited with respect to China. There is also very little public information available about the nuclear stockpiles of the three de facto nuclear weapon states—India, Israel and Pakistan—and about the numbers and the operational status of their nuclear weapon delivery systems, including ballistic and cruise missiles, artillery and aircraft. Despite the lack of transparency, several NGOs—including SIPRI—compile and publish estimates of nuclear force holdings.⁸⁶

The nuclear arms limitation and reduction treaties concluded during the cold war provided for verification measures that have introduced a limited degree of public transparency into Russian and US deployed strategic nuclear forces.⁸⁷ However, there is still no reliable information about the numbers and operational status of Russian and US non-strategic (or 'tactical') nuclear weapons. These weapons remain unregulated by any legally binding arms control agreement. They pose special challenges for arms control accountability—they are mobile and too small to be monitored by traditional national technical means—and their associated delivery systems can be used to deliver conventional as well as nuclear munitions.⁸⁸

A number of studies have advocated the idea of establishing a comprehensive transparency regime for nuclear warheads and materials in order to complement and strengthen treaties imposing numerical limits on nuclear forces.⁸⁹

⁸⁵ See, e.g., documents published by the Nuclear Information Project at URL <<http://www.nukestrat.com/>>.

⁸⁶ See appendix 13A in this volume. Additional information about world nuclear weapon inventories is also available in the Federation of American Scientists Nuclear Forces Guide at URL <<http://www.fas.org/nuke/guide/>>. The Russian Nuclear Forces Project maintains a comprehensive website devoted to information about Russia's strategic nuclear forces at URL <<http://russianforces.org/eng/>>. For comprehensive estimates by non-governmental experts of global inventories of highly enriched uranium and plutonium see Albright, D., Berkhout, F. and Walker, W., SIPRI, *Plutonium and Highly Enriched Uranium 1996: World Inventories, Capabilities and Policies* (Oxford University Press: Oxford, 1997).

⁸⁷ Under the 1991 Treaty on the Reduction and Limitation of Strategic Offensive Arms (START I Treaty), Russia and the USA exchange classified memoranda of understanding about their deployed strategic nuclear delivery vehicles, and the warheads attributed to them under START I counting rules, every 6 months. Declassified versions of this data are made available to the public. See, e.g., US Department of State, Bureau of Arms Control, 'START aggregate numbers of strategic offensive arms', Washington, DC, 1 Oct. 2005, URL <<http://www.state.gov/t/ac/rls/fs/54166.htm>>. On START I see annex A in this volume.

⁸⁸ Handler, J., 'The September 1991 presidential nuclear initiatives and the elimination, storing and security aspects of TNWs', ed. T. Susiluoto, *Tactical Nuclear Weapons: Time for Control* (UN Institute for Disarmament Research: Geneva, 2002), pp. 107–32.

⁸⁹ E.g., Fetter, S. and Feiveson, H. A., 'Verifying deep reductions in nuclear forces', ed. H. A. Feiveson, *The Nuclear Turning Point: A Blueprint for Deep Cuts and De-alerting of Nuclear Weapons* (Brookings Institution Press: Washington, DC, 1999), URL <<http://www.brook.edu/press/books/nucturn.htm>>. On the political and technical dimensions of creating a nuclear warhead transparency regime see Zarimpas, N. (ed.), SIPRI, *Transparency in Nuclear Warheads and Material: The Political and Technical Dimensions* (Oxford University Press: Oxford, 2003).

This would involve *inter alia* declaring and verifying existing stockpiles of warheads and weapon-usable fissile material, monitoring the dismantling of individual weapons, and verifying the safe and secure disposal of the fissile material that they contained. Attempts by Egypt and some other countries to establish a UN nuclear register and include nuclear weapons in the UNROCA have failed, as have attempts to create a nuclear transparency regime in the Russian–US context.⁹⁰

V. Disposal of arms

Global major weapon inventories (as well as armed forces personnel and employment in arms production) are decreasing owing to military modernization.⁹¹ This modernization might imply that fewer weapons are needed as each weapon becomes more technologically sophisticated and acquires a higher military capability, or that old weapons are exchanged for new weapons. In either case, weapons become surplus. Rather than paying for their storage, countries may destroy them or, in the case of SALW and major conventional weapons, export them.

In addition, weapons are disposed of under the auspices of multinational organizations or agreements. From the 1990s, the disposal of conventional weapons and ammunition inventories in the countries of the former Soviet Union in particular, as well as WMD in some of these and other countries, has been among the most urgent tasks. During the 1990s major conventional weapons in Europe were disposed of under the CFE Treaty.⁹² Today, SALW, including landmines, and ammunition are being disposed of under post-conflict arrangements in many regions, often under UN management.⁹³ The UN has designated 9 July as International Weapons Destruction Day, focusing on illicit small arms around the world.⁹⁴ In Europe, SALW and ammunition are disposed of under the auspices of the OSCE and NATO's Partnership for Peace Trust Fund.⁹⁵ However, the particular problems of transparency in the

⁹⁰ In 1994–95 talks were held in the Joint Working Group on Safeguards, Transparency and Irreversibility, a forum launched for negotiations to establish a new arms control regime covering Russian and US stockpiles of nuclear weapons and fissile materials. These talks ended inconclusively.

⁹¹ Bonn International Center for Conversion (note 77), p. 29.

⁹² See chapter 15 in this volume.

⁹³ Small Arms Survey (note 28), pp. 267–301. See also 'Small arms and light weapons', *Compendium of Good Practices on Security Sector Reform* (Global Facilitation Network for Security Sector Reform: Shrivenham, 2005), URL <http://www.gfn-ssr.org/good_practice.cfm>. Anti-personnel landmines are one type of 'small arm' around which the international community is to a large extent united in the need for action. The Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction (APM Convention) was opened for signature on 3 Dec. 1997 and came into force on 1 Mar. 1999; the text of the convention is available at URL <<http://www.un.org/millennium/law/xxvi-22.htm>>. See also annex A in this volume; and Foreign Affairs Canada, 'Canada's guide to the global ban on mines', SafeLane website, URL <<http://www.mines.gc.ca/>>.

⁹⁴ 'International Weapons Destruction Day', *Federalist Debate*, vol. 18, no. 3 (Nov. 2005), p. 46.

⁹⁵ The Partnership for Peace Trust Fund was established in Sep. 2000, originally to assist in the destruction of stockpiled anti-personnel landmines under the APM Convention. In 2005 a new project was created to help Ukraine, this time to destroy stockpiles of surplus munitions, SALW and MANPADS over 12 years. 'Trust Fund project to destroy surplus weapons and ammunition in Ukraine',

production, transfers and inventories of many SALW makes it difficult to know how many of these weapons remain in civilian or military circulation.

Weapons of mass destruction

The ending of the cold war brought dramatic decreases in the size of the US and former Soviet nuclear arsenals. However, only limited public information is available about the numbers of nuclear warheads that have been disassembled and eliminated. There are no treaty-mandated arrangements for monitoring the dismantlement of warheads, since the parties are concerned that this process could reveal sensitive design information. Many arms control advocates have promoted the idea of requiring the irreversible elimination of nuclear warheads as a way of making permanent the treaty-mandated force reductions. The idea has been rejected, primarily because of US objections that it would inhibit the parties' ability to 'reconstitute' their strategic forces in the event of an unexpected change in the security environment.⁹⁶

According to figures provided by the US Department of Energy, during the decade after 1989 the USA removed from service and dismantled about 11 000 nuclear warheads.⁹⁷ These included non-strategic nuclear warheads that were deployed by the USA outside its territory.⁹⁸ US Department of Defense and Central Intelligence Agency estimates suggest that Russia dismantled slightly more than 1000 warheads per year during the 1990s; that is, more than 10 000 were dismantled over the decade.⁹⁹ In addition, the two countries have eliminated several categories of nuclear weapon systems, including intermediate-range land-based missiles, artillery shells and landmines. With the end of the cold war, the UK also significantly reduced its nuclear arsenal. This included the withdrawal from service and elimination of its stockpile of

NATO's Nations and Partners for Peace, vol. 50, no. 1 (2005), p. 118. See also 'NATO achieves demilitarization milestones in Albania, Ukraine', *Jane's International Defence Review*, Jan. 2006, p. 17.

⁹⁶ On the Russian–US Strategic Offensive Reductions Treaty (SORT) negotiations see Kile, S. N., 'Nuclear arms control, non-proliferation and ballistic missile defence', *SIPRI Yearbook 2003* (note 51), pp. 600–602. On the SORT itself see annex A in this volume.

⁹⁷ Norris, R. S. and Kristensen, H. M., 'Nuclear notebook: U.S. nuclear reductions', *Bulletin of the Atomic Scientists*, vol. 60, no. 5 (Sep./Oct. 2004), pp. 70–71. The USA produced c. 70 000 nuclear warheads in 1945–90. At its peak, in 1967, the US operational stockpile held c. 32 000 warheads.

⁹⁸ In 2005 the USA deployed c. 160 aircraft-delivered nuclear bombs in NATO countries in Europe. In 1985 the USA deployed c. 6500 weapons, encompassing a number of different types, in Europe. Kile, S. N. and Kristensen, H. M., 'World nuclear forces, 2005', *SIPRI Yearbook 2005* (note 12), pp. 578–602; and Arkin, W. M., 'Nuclear weapons', *World Armaments and Disarmament: SIPRI Yearbook 1986* (Oxford University Press: Oxford, 1986), pp. 37–80.

⁹⁹ Kristensen, H. M., 'World nuclear forces', *SIPRI Yearbook 2004* (note 24), p. 633. In addition, a variety of nuclear weapon-related dismantlement and security projects have been undertaken as part of the Russian–US Cooperative Threat Reduction (CTR) programme. The programme was initiated by the US Government in 1991 and since 1993 has evolved to encompass a wide range of nuclear non-proliferation and demilitarization activities across the former Soviet Union in addition to weapon destruction and dismantlement. SIPRI Pilot Project, *Strengthening European Action on WMD Non-proliferation and Disarmament: How Can European Community Instruments Contribute?*, Interim report (SIPRI: Stockholm, Nov. 2005); and Anthony, I., *Reducing Threats at the Source: A European Perspective on Cooperative Threat Reduction*, SIPRI Research Report no. 19 (Oxford University Press: Oxford, 2004).

aircraft-delivered nuclear bombs, which was completed in 1998. Although France has made smaller cuts in its nuclear arsenal, it has removed some categories of nuclear delivery vehicles from service. These include its entire force of land-based ballistic missiles.

No internationally transparent destruction of biological weapons is currently under way. The parties to the BTWC committed themselves to destroy any such stockpiles when they joined the regime in the 1970s and 1980s, but there is no mechanism requiring the parties to submit legally binding annual declarations or for an international body to verify the content of such declarations. Moreover, no state that is not a party to the BTWC is currently willing to publicly acknowledge having an offensive biological weapon programme or stockpiling such weapons.

In contrast, the amount and type of chemical weapons held by states parties to the CWC are well documented. These weapons, including old or abandoned weapons, are currently being verifiably destroyed, and the main results are publicly available. As of November 2005, of approximately 71 373 agent tonnes of declared chemical weapons, about 12 332 agent tonnes had been destroyed; and of approximately 8.7 million declared items, about 2.4 million munitions and containers had been destroyed.¹⁰⁰ As of the same date, 12 states had declared 64 chemical weapon production facilities, of which 37 had been certified as being destroyed and 14 as being converted for purposes not prohibited under the CWC.¹⁰¹

The cost of disarmament

The disposal or destruction of weapons (outside of actual combat), as well as cleaning of the production sites, is not without cost.¹⁰² It relates both to ‘the remnants of previous wars’ and ‘the remnants of the present peace’ as the destruction of weapon stockpiles and installations is in consequence of them not having been used or not (being allowed to be) used in today’s and future wars. The cost of disposal or destruction may be too high for an individual country. The most critical period in the CFE destruction process was 1993–95, when the force reduction took place. The responsibility was with individual states parties, and some nations requested assistance: in 1994 Belarus and Ukraine received approximately \$10 million from the US Congressional Peace Project.¹⁰³ In 2000, financial problems arose concerning Russian military equipment in Georgia and Moldova and ammunition in Moldova. The OSCE set up a fund for helping Russia with the disposal. Various programmes are ongoing for the elimination of ‘the remnants of the war that never was’ (the cold war

¹⁰⁰ Organisation for the Prohibition of Chemical Weapons, ‘Inspection activity’, URL <http://www.opcw.org/ib/html/insp_act.html>.

¹⁰¹ These 12 states are Bosnia and Herzegovina, China, France, India, Iran, Japan, South Korea, Libya, Russia, Serbia and Montenegro, the UK and the USA.

¹⁰² See reports from the UN Institute for Disarmament Research (UNIDIR) Costs of Disarmament project, 1999–2004, URL <http://www.unidir.ch/bdd/fiche-activite.php?ref_activite=3>.

¹⁰³ *Arms Control Reporter*, sheet 407.B.507-8, 1994.

legacy)—small arms, excessive ammunition, unexploded ordnance and toxic rocket fuel—in the OSCE area.¹⁰⁴ To assist the former Soviet republics, among others, the OSCE acts as the clearing house, and financial resources are sought from such international bodies as NATO, the EU and the UN Development Programme.¹⁰⁵

The cost of getting rid of ‘remnants of peace’ is substantial, but in most cases not prohibitive, especially with US and international support. Should such expenditure be considered ‘defence’ expenditure, in the same way as military pensions remain a military expenditure even after the individuals have left active service? Certain expenditure for weapon destruction is indeed included in Russian military expenditure. For other countries, such expenditure may or may not be included in their reported military expenditure.

VI. Conclusions

Four questions were formulated in section I. Is quantitative information available? What are its qualitative features? Has there been any notable change in transparency over the years? To what extent can such changes be attributed to policy or demands from the public? The answer is that data are available but they rarely meet all the quality tests of availability, reliability, comprehensiveness, comparability and disaggregation for each of the phases.¹⁰⁶ There are no general grounds for confidence in the quality and validity of government information, and it can only be evaluated once the definitions, sources and methods used for compilation and calculations are known. As noted above, there are variations between countries in the definitions that determine what they include and exclude in their reported data. The problem of definition is increasing, while the activities of arms producers remain partly beyond the control of the citizens of countries where they operate. The multivalent nature of many current innovations in science and technology is making it both more important, and harder, to pin down and compare amounts devoted to specifically military R&D.

The lack of internationally agreed definitions, or adherence to existing definitions, poses obvious problems for international comparisons. The effort devoted by SIPRI over the years to making data on military expenditure, arms production and arms transfers reliable and internationally comparable illus-

¹⁰⁴ The OSCE in 2000 adopted a far-reaching document on the control of SALW. A special report in 2004 pointed to many remaining difficulties; ‘Disposal of surplus small arms: a survey of policies and practices in OSCE countries’, Bonn International Center for Conversion (BICC), British American Security Information Council (BASIC), Saferworld and Small Arms Survey, Jan. 2004, URL <<http://www.basicint.org/pubs/Joint/2004OSCE.htm>>. The national cases were Belarus, Bulgaria, Germany, Norway, Poland, Romania, Russia, Switzerland, the UK and the USA. See also Bailes, A. J. K., Melnyk, O. and Anthony, I., *Relics of Cold War: Europe’s Challenge, Ukraine’s Experience*, SIPRI Policy Paper no. 6 (SIPRI: Stockholm, Nov. 2003), URL <<http://www.sipri.org/>>.

¹⁰⁵ Lachowski, Z. and Dunay, P., ‘Conventional arms control and military confidence building’, *SIPRI Yearbook 2005* (note 12), p. 661.

¹⁰⁶ A further issue is timeliness: since quantitative information is typically available only in retrospect (except for military expenditure forecasts, which turn out to be inaccurate for many reasons), it does not in itself guarantee any real-time public consultation and control.

trates the amount of time and resources needed for such work. Despite those efforts and despite the rise in the number of military and defence journals, especially between 1950 and 1980 (as well as many other relevant publications),¹⁰⁷ there is still no systematic, reliable, valid and global—or in most cases, even regional—set of quantitative data on the topics discussed in this chapter. Persistent government preferences for secrecy are part of the explanation, as illustrated by the limited transparency in national arms inventories in general and nuclear and biological weapons in particular. Although some progress has been made since the late 1960s towards greater transparency in nuclear arsenals, there remain large uncertainties about global inventories of nuclear weapons and weapon-usable fissile materials. For biological weapons, as suggested above, transparency could even be decreasing.

More positive trends have been noted regarding data on chemical weapons, military expenditure and arms transfers. Chemical weapons destroyed as well as remaining stockpiles are reported in detail by the OPCW. Increasing transparency on arms transfers is partly the result of public demand, as seen in the publication of the Annual Report on the EU Code of Conduct on Arms Exports. This increase is also a result of governments' willingness to release more and better data. Data on military expenditure—an important share of public finance in many countries—have become, among other things, part of the policy debate about development assistance, and the changing character of threats and armed conflicts has also increased the demand for data on internal security expenditure and on the balance between expenditure for internal and external security. Such demands come not only from governments and their development assistance agencies, but also from foreign investors and NGOs. The Small Arms Survey illustrates the increasing political relevance of all aspects of small arms and light weapons. In addition, public transparency can be a by-product of the growing multilateralization of peace operations and of institutional and regional programmes for capability enhancement. However, the existence of national forces and stocks of weapons abroad, as well as access to foreign bases, makes it hard to keep track of the exact size and deployment of national inventories at a given time, let alone to assess operational military capability in a particular regional setting.

The sustained and systematic work needed to increase, or simply maintain, the public transparency of the arms life cycle makes for a daunting task. Making the whole life cycle more transparent will call for major additional resources. Meeting that demand is a challenge to all governments and other organizations that count public transparency among their highest aims.

¹⁰⁷ Thanks are due to Nenne Bodell, SIPRI Head Librarian, for an overview of existing and former major military/defence journals from the earliest US and Indian journals in the late 19th century until 2005.

