

Strengthening International Security Through International Law

The Case of Nuclear, Missile and Space Weapons

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1 The link between international security and international law

Many of the risks that the world faces today, including risks of proliferation and nuclear war, violent regional conflicts and the threat from terrorist attacks, or climate change and environmental disasters, cannot be resolved or prevented by a single nation, even not the most powerful one. Thus collaboration and agreement of the international community is required to tackle these challenges, codified by international law to provide mutual assurance that policies are pursued in an integrated, coordinated and effective way. Without international law states are not bound and can act freely according to individual security interests and threat perceptions. International law defines the rules of the game to diminish conflict and enhance cooperation.

How important these rules are is well demonstrated by the prisoners' dilemma in game theory. Here two actors are in a better situation if they both cooperate rather than do not cooperate. However, by individually defecting from cooperation they could aim for individual gains as long as the other actor continues to cooperate. If both sides individually give up cooperation for these benefits, they end up in a situation which is worse for both. To prevent both actors from non-cooperation for the mutual benefit requires agreement based on communication, verification and control to enforce the agreement. To discourage violations of an agreement they need to be detected and the expected benefits from violation to be neglected. This can be done either by the other actor who also leaves the agreement or a violation is detected and punished by an authority. Important is that a violation needs to be reliably verified and the response is a credible. While both requirements could be realized by the actors according to their capabilities and interests, it is more efficient to transfer these tasks to an authority which is not bound by the individual capabilities and interests. To verify and enforce compliance with an agreement it needs to be prescribed in the clearest possible way within a framework of accepted legal terms.

The consequences of unregulated warfare and arms race have been demonstrated throughout military history where actors were caught in prisoners' dilemma situations or, even worse, in zero-sum games where the gain by one actor could only be achieved by the losses of another actor and thus no common ground for cooperation was possible. Under such circumstances it was hard for actors to preserve their security, i.e. to avoid threats to their very existence and identity. Events that could cause intolerable damage and have a significant likelihood lead to insecurity to vulnerable actors. If the existence or identity of actors is at stake in such conflicts, they mobilize their resources to survive. Strategic thinking, power plays and mutual threat perceptions have produced an enormous increase in military capabilities that increased rather than reduced the security dilemma. An unregulated interaction often supported worst-case scenarios resulting in arms race and war which were only restrained by the capabilities and resources of the actors involved.

In international relations the key actors are nation states which seek to preserve their existence and identity in their interaction against all potential risks, in particular against threats from other nations' use of force. International law regulates interactions by restraining actions of states and providing rules that everyone can rely on. Restraining the threatening capabilities is thus an important incentive for arms

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control, disarmament and non-proliferation agreements that seek to enhance stability and reduce the risks and costs of conflict. These set limits, defines rules, design verification and enforcement mechanisms. Reducing capabilities however is not enough and often not possible as long as motivations are driving these capabilities. It is therefore essential to also deal with these motives through security policies that diminish strategic incentives and threat perceptions.

While international law can contribute to international security in different ways, multilateral treaties alone cannot ensure security, but they offer a framework to address today's security challenges. Multilateral treaties and the regimes they establish "contribute to national and global security by articulating norms, creating monitoring and enforcement mechanisms, and providing benchmarks for progress."² A key issue is whether the verification and enforcement mechanisms work and are sufficient to detect and deter violations. A respected authority that could provide these tasks effectively does not yet exist in the international system. The UN Security Council is still bound by the veto power of its permanent members which are the nuclear weapon states.

While the benefits of cooperation and international law may be obvious, the distribution of these benefits can be uneven. Some states may not see the benefits worth the costs, in particular the restraints on their sovereignty. The situation is particularly difficult with a hegemon who pursues unlimited power projections independent of other actors. This is most vividly demonstrated by the tendency of the Bush administration to move away from binding international law and multilaterally agreed arms control to rely on its own (military) strength. A doctrine of superiority that relies on nuclear weapons, missile defenses and dominance in space could create enormous uncertainties, instabilities and risks for international security that could undermine even the national security of the United States.

Even though the prospects for international law and arms control based on multilateral agreements currently seem remote, this should not exclude conceptual thinking about and broadening political support for alternatives. The author is convinced that conceptual thinking is important, even more under the current circumstances when even incremental steps seem to be excluded. The quest for strengthening international law in general and arms control and disarmament in particular should not only be based on political opportunity, in particular not on the preferences, interests and power structures of current administrations. It is essential to conceptualize and design long-term alternatives beyond day-to power games in order to create conditions for long-term change.

In this paper some alternative concepts are presented, based on previous work by the author on the control of nuclear weapons, ballistic missiles, missile defenses and space weapons, all of which have shaped the security landscape after World War 2. While military arms races before the war were often driven by the offense-defense interaction and technological change, the strategic situation drastically changed with the advent of nuclear weapons and ballistic missiles which enormously increased the damage potential compared to conventional weaponry. Nuclear weapons not only threaten the existence of nation states but of mankind as such. Ballistic missiles allowed to cross large distances with a speed unknown before. While bullets from guns cross distances at several hundred meters per second (which make reactions at close distance impossible), ballistic missiles reach ten times that speed, practically excluding reactions over continental and even intercontinental distances. The combination of enormous power and high speed over large distances created an irresistible weapon: the nuclear-armed Intercontinental Ballistic Missile (ICBM). With these it became possible to leave the Earth's atmosphere and fly through outer space which

² N. Deller, A. Makhijani, J. Burroughs, eds., *Rule of Power or Rule of Law? An Assessment of U.S. Policies and Actions Regarding Security-Related Treaties*, Apex Press, 2003. For surveys on international law see: B.H. Weston, R.A. Falk, H. Charlesworth, *International Law and World Order*, 3rd ed., West Group, 1997; M.N. Shaw, *International Law*, 5th ed., Cambridge University Press, 2003; A. Cassese, *International Law*, Oxford University Press, 2001; C. Ku, P. Diehl, eds., *International Law: Classic and Contemporary Readings*, Lynne Rienne, 1998.

not only transformed global warfare, but also opened the possibility of space warfare. Ballistic missiles became vehicles to launch objects into Earth orbit for an extended period. Because of the enormous speed of ballistic missiles and the vast range of their trajectory, attempts to counter this threat by missile defense systems failed until today. However, missile defenses open a Pandora's box of weapons to intercept missiles in space. The need for a physical mechanism that is faster than the movement of masses, spurred the development of directed energy weapons such as laser weapons that work at the speed of light.

The control of these weapons is discussed in the following, with a focus on a Nuclear Weapons Convention, international control of ballistic missiles and other delivery systems, and the strengthening of international law of outer space by concepts of space security and a space weapons ban. In the end, the role of verification and enforcement is discussed.

2 Nuclear disarmament and the Nuclear Weapons Convention³

The political context

After the end of the Cold War the demand for a nuclear-weapon-free World (NFWF) found increasing support among governments and non-governmental organizations (NGOs). From the beginning the debate focused on both the desirability and the feasibility of this goal.⁴ After the 1995 Review and Extension Conference of the NPT a political chain of actions for the abolition of nuclear weapons emerged, including the protest against nuclear testing; the Hiroshima and Nagasaki anniversaries; the Nobel Peace Prize for Pugwash and Joseph Rotblat; the foundation of the "Abolition 2000" Global Network and of the Canberra Commission on the Elimination of Nuclear Weapons; the advisory opinion of the International Court of Justice (ICJ) on the legality of the threat or use of nuclear weapons; and a statement by 60 military leaders, calling for the elimination of nuclear weapons.

One of the ideas of how to achieve a NFWF became the concept of a Nuclear Weapons Convention (NWC). Such a comprehensive Convention would effectively prohibit and eliminate all nuclear weapons and their infrastructure. It would supplement a Biological Weapons Convention and a Chemical Weapons Convention, completing the ban on all weapons of mass destruction. The NWC concept has been suggested since its foundation in 1993 by the International Network of Engineers and Scientists Against Proliferation (INESAP) and was supported by the International Coalition for Nuclear Non-Proliferation and Disarmament, including NGOs such as IPPNW, IPB, IALANA, INES and INESAP as founding members.⁵ An INESAP Study Group, comprising more than 50 experts from 17 countries, presented its report "Beyond the NPT: A Nuclear-Weapon-Free World" during the NPT Review and Extension Conference in New York in April 1995, which outlines the transformation process of the traditional non-proliferation regime into a NFWF regime, represented by a Nuclear Weapons Convention. The substance of the NWC is summarized as follows:⁶

³ This section is based on: J. Scheffran, Content and Verification of a Nuclear Weapons Convention, in: J. Rotblat (Ed.), *Remember Your Humanity*, Singapore: World Scientific, 1999, 318-334.

⁴ J. Rotblat, J. Steinberger, B. Udgaonkar (eds.), *A Nuclear-Weapon-Free World: Desirable? Feasible?*, Boulder et al.: Westview Press, 1993. Considerations on a comprehensive nuclear disarmament treaty are made in this book by M. Bruce, H. Fischer, T. Mensah, *A NFWF Regime: Treaty for the Abolition of Nuclear Weapons*, 119-131.

⁵ See documents in INESAP Information Bulletin No.1, April 1994. For a more recent update see: J. Scheffran, W. Liebert, M. Kalinowski, *Beyond the NPT: The Nuclear-Weapons-Free World*, INESAP Information Bulletin, No. 25, April 2005, 4-9.

⁶ *Beyond the NPT – A Nuclear-Weapon-Free World*, INESAP Study Group Report, Darmstadt/New York, 1995, p.9. The Executive Summary has been published as a supplement in INESAP Bulletin No.6, July 1995.

“The NWC would have to ban not only the possession and production of nuclear weapons; it would also prohibit all kinds of acquisition (including research), transfer, deployment (or any preparations for re-deployment), use and threat of use. The convention would call for the elimination of the whole infrastructure serving the manufacture and possession of nuclear warheads and their means of delivery. It would provide a system of international control for guarding and accounting for all remaining weapon-usable fissile material. The convention would incorporate, and thus replace, other existing relevant treaties as bans on nuclear weapon tests, and on the production of weapon-grade fissile material - it would make these bans universal. The convention would replace the NPT itself.”

On the same occasion a statement was signed by more than 200 NGOs, that became the founding document for Abolition 2000 global network. In the first of 11 demands it calls for *"negotiations on a nuclear weapons abolition convention that requires the phased elimination of all nuclear weapons within a timebound framework, with provisions for effective verification and enforcement."*

In its August 1996 report, the Canberra Commission on the Elimination of Nuclear Weapons identified two options to achieve a NWFV through an *"incremental approach of a number of separate instruments or through a comprehensive approach which would combine all relevant instruments into a single legal instrument, a nuclear weapons convention."* The comprehensive approach would entail *"the negotiation of a new treaty prohibiting the development and possession of nuclear weapons to replace the NPT and possibly other treaties such as a CTBT and possible future conventions on the cessation of the production of fissile materials for nuclear explosive purposes and on the non-first use of nuclear weapons."*⁷

In its 1998 report on *"The Future of U.S. Nuclear Weapons Policy"* the U.S. National Academy of Sciences' Committee on International Security and Arms Control mentioned as one of four possible disarmament approaches: *"an international conference charged with creating a new treaty to prohibit the possession of nuclear weapons. This new treaty would replace the NPT and possibly other treaties such as the Comprehensive Test Ban Treaty. The negotiations leading to the Biological and Chemical Weapons Conventions are examples of an international process to outlaw an entire class of weapons"*⁸

The demand for NWC negotiations reached the government level with three resolutions adopted by the United Nations General Assembly on December 10, 1996.⁹ The UNGA re-adopted the 1995 timebound framework resolution 51/45 O and also re-adopted the resolution 51/46 D introduced by India which calls for negotiations on a Convention on the Prohibition of the Use of Nuclear Weapons, both with the additional reference to concluding a NWC. These additions were inspired by the resolution 51/45 M that was newly introduced by Malaysia. This resolution welcomed the unanimous conclusion of the ICJ that *"there exists an obligation to pursue in good faith and bring to a conclusion negotiations leading to nuclear disarmament in all its aspects under strict and effective international control"*, and called upon *"all states to fulfill that obligation immediately by commencing multilateral negotiations in 1997 leading to an early conclusion of a nuclear weapons convention prohibiting the development, production, testing, deployment, transfer, threat or use of nuclear weapons and providing for their elimination."* The Malaysian resolution, with the lobbying power of the Abolition 2000 Global Network, gained more cosponsors and positive votes (two-thirds of the voting states) than the other two resolutions, including a

⁷ Report of the Canberra Commission on the Elimination of Nuclear Weapons, Canberra, August 1996.

⁸ The other three options are: a convention limited to the five nuclear weapons states, supplementing the NPT; an NPT amendment process; and an expansion of the nuclear weapon free zones. See: *The Future of U.S. Nuclear Weapons Policy*, Report by the Committee on International Security and Arms Control, National Academy of Sciences, Washington, DC: July 1997.

⁹ The UN has, from its very first resolution Res. 1, 1(1) in 1946, supported the goal of the elimination of nuclear weapons, however without specific plans of how to reach such a goal until the 1995 resolution (Res. 50/70 P), calling for a timebound framework for nuclear disarmament.

number of Western countries and China as a nuclear weapons state.¹⁰ In March 1997, a majority of the European Parliament supported the central demand for NWC negotiations.

Negotiations on a Nuclear Weapons Convention could serve as a framework for the elimination of nuclear weapons, focusing, harmonizing and joining together future non-proliferation and disarmament measures into an integrated concept. Within an incremental-comprehensive approach, unilateral measures and declarations could be combined with bilateral negotiations between USA and Russia, negotiations among the P-5 and multilateral negotiations in the Conference on Disarmament (CD) or other bodies. Incremental and comprehensive approaches to a NFWF would complement and reinforce one another. Single measures could serve as building blocks of a comprehensive convention which could be realized step-by-step. Such steps include a no-first use for nuclear weapons and further security guarantees, new nuclear-weapon-free zones, a deep reduction of the nuclear arsenals and delivery systems, a ban on nuclear-weapons materials, further restrictions on nuclear weapons development as well as the closure and conversion of nuclear weapons facilities. Concerns of states about asymmetries and disadvantages inherent in single steps need to be balanced.

To demonstrate the feasibility of a comprehensive phased plan for nuclear disarmament and to promote negotiations toward this goal, the Lawyers' Committee on Nuclear Policy (LCNP), in collaboration with INESAP and IPPNW and with support by the Abolition 2000 network initiated the drafting of a Model NWC. In February, 1996, a drafting committee of lawyers, academics, scientists, disarmament experts and diplomats was established which held meetings in New York and Darmstadt, Germany. One principle for the drafting has been the *"search for a regime sufficiently restrictive to ensure the highest level of confidence in compliance, but also sufficiently permissive to allow states to join without jeopardizing their legitimate security interests and commercial activities"*.¹¹ Drawing on existing treaties and documents (START and INF Treaties, Chemical Weapons Convention, regional Nuclear Weapon Free Zones, Comprehensive Test Ban Treaty, Security Council resolutions, IAEA safeguard agreements), the essential elements of a comprehensive convention to prohibit and eliminate nuclear weapons were identified. The drafting committee was able to complete the first discussion draft in a relatively short period of time and presented it to the public during the NPT PrepCom in April 1997. With support by Costa Rica the Model NWC became a UN document in the same year and was published as a book in 1998 with explanations and comments.¹²

Although the Middle Powers Initiative and the New Agenda Coalition opened new opportunities for action, after 1997 the political conditions for nuclear disarmament dramatically declined. Nuclear and missile testing by India and Pakistan in 1998 as well as missile testing by Iran and North Korea played into the hands of those in the United States who shifted the coordinates towards missile defense and a "conservative revolution". In addition to these and other factors the terrorist attacks of 9/11 and the war in Iraq induced a chain of violent events that made the prospects for disarmament very remote. An obvious indicator is the stalemate at the Geneva Conference on Disarmament since 1997.

¹⁰ See M. Datan, A. Ware, J. Scheffran, Nuclear Weapons Convention on Track, INESAP Bulletin, No. 11, Dec. 1996, pp. 4-6. The link between the ICJ judgement and the NWC has been analyzed in: W. Liebert, J. Scheffran, M. Kalinowski, Vom Urteil des Weltgerichtshofs zur Nuklearwaffenkonvention, in: IALANA (Ed.), Atomwaffen vor dem Internationalen Gerichtshof, Münster: LIT-Verlag, 1997, pp. 367-385.

¹¹ Commentary on the Model Nuclear Weapons Convention, New York: LCNP, April 1997, 1.

¹² M. Datan, A. Ware, M. Kalinowski, J. Scheffran, V. Sidel, J. Burroughs, Security and Survival. The Case for a Nuclear Weapons Convention, IPPNW/IALANA/INESAP, Cambridge, 1998.

Structure and content of the Model Nuclear Weapons Convention

The Model Nuclear Weapons Convention comprises 19 Articles on 60 pages, 8 preliminary Annexes/Protocols plus a Commentary, a Summary and Statement of Purpose. The Preamble refers to previous agreements and to guiding principles of the Convention. Article I contains general obligations not to "research, develop, test, produce, otherwise acquire, deploy, stockpile, maintain, retain or transfer nuclear weapons" as well as related nuclear materials, delivery systems and components, and not to use or threaten to use nuclear weapons. All existing nuclear weapons, their development and production facilities as well as delivery systems, command and control facilities are to be destroyed or converted (see the list of obligations in the box). The prohibitions also cover special nuclear materials, i.e., fissionable or fusionable materials that can be used to build a nuclear weapon (especially highly-enriched uranium, uranium-233, plutonium, tritium). The obligation to place special nuclear materials under international control until a safe method of disposition is found would make diversion of such materials more difficult.

In Article II, 81 definitions are given which are an integral part of the Model NWC. They are important to avoid ambiguity and potential loopholes which facilitate circumvention. For the definition of nuclear weapons, different alternatives are offered. According to the first definition, drawn from the Treaty of Tlatelolco, they comprise "any device which is capable of releasing nuclear energy in an uncontrolled manner and which has a group of characteristics that are appropriate for use for warlike purposes." The phrase "group of characteristics" is not specified. The second definition is more comprehensive and includes radiological weapons and weapons with nuclear triggers such as particle beam and high energy laser weapons. It includes explosive devices "in assembled or disassembled form" in order to prevent attempts to circumvent the provisions of the Convention by removing a key component and rendering an otherwise functional nuclear weapon temporarily inoperable. The language "designed for or capable of" allows the definition to cover devices that might not have been originally designed as nuclear weapons but could be used as such (close to the War Weapons Control Act of Germany). While under these definitions a nuclear warhead by itself is a weapon, an alternative approach would be to consider the entire system--including the delivery vehicle--as a weapon, e.g., a complete ICBM. The current Model NWC, however, includes separate provisions on warheads and delivery vehicles.

Article IV: Phases for Implementation (numbers optional)

All production of nuclear weapons and nuclear weapons usable material would cease on the date of entry into force.

- i) Within (one) year(s) of entry into force, all nuclear weapons would be taken off alert status. All nuclear weapons and their delivery vehicles shall be removed from deployment. Each State Party would submit to the Agency plans for the implementation of its obligations under the Convention.
- ii) Within (two) years of entry into force, all nuclear warheads would be removed from delivery vehicles, all nuclear weapons would be disabled, including the removal of trigger mechanisms. Production, research, and testing facilities would be closed or slated for conversion.
- iii) Within (five) years of entry into force, the nuclear weapons of Russia and U.S. would be reduced to a fixed number of warheads or less, with proportional reductions by other Nuclear Weapons States. Nuclear weapons delivery vehicles would be destroyed or converted for purposes not prohibited under the Convention.
- iv) Within (10) years of entry into force there would be further significant cuts in the number of nuclear weapons of all Nuclear Weapons States. All reactors using highly enriched uranium would be closed or converted to reactors using low enriched uranium. All nuclear weapons usable material would be placed under strict, effective and exclusive international control. In addition, all reactors using plutonium as fuel would be closed or converted to reactors that do not use any weapons grade material.
- v) Within (15) years of entry into force, all nuclear weapons would be destroyed and the Agency's role in carrying out the objectives of the Convention would be reviewed and adjusted as appropriate.

A third approach to the definition of nuclear weapons would be to follow the pattern of the Chemical Weapons Convention. The premise would be that any radioactive isotope (beyond a specified quantity or concentration) which might be used in a weapon to cause death, harm, or incapacitation to life forms or their genetic structures, must be destroyed, prohibited or carefully controlled. This definition is complicated by the fact that basically all materials undergo a radioactive decay within a certain half-life. There is an on-going scientific debate over which concentration and periods radioactive materials is harmful to life. Many chemicals can be also toxic at certain amounts (e.g. alcohol, medicaments, etc.) but they would not be called "weapons". Important is the potential degree of harm and the practical usability as a weapon. The degree to which nuclear materials are harmful is left to future research.

In Art.IV, the Model NWC proposes a flexible series of coordinated phases for implementation. The suggested deadlines are offered as recommendations and are based on evaluations of technical feasibility, with the understanding that states would negotiate the actual deadlines. Moreover, the NWC allows for extension of deadlines if a State Party is unable to complete obligations within the time allotted. One proposed scenario for phased elimination of nuclear weapons is given in the following box.

3 The international control of delivery systems¹³

While many countries have agreed to eliminate biological and chemical weapons and also pledged in the Non-Proliferation Treaty (NPT) to forgo or eliminate nuclear weapons, there is still no multinational treaty restricting the development and use of delivery systems. Although the NPT preamble emphasizes "the elimination from national arsenals of nuclear weapons and the means of their delivery pursuant to a Treaty on general and complete disarmament under strict and effective international control", the NPT does not further specify how this ultimate goal could be achieved for delivery systems. Until recently, ballistic missiles and other delivery systems have been largely ignored in international arms control and disarmament negotiations. This deficit was pointed out by Jayantha Dhanapala, the UN Under-Secretary-General for Disarmament Affairs: "Why is public debate mired today in a duel between deterrence and defense, with scant attention to missile disarmament?"¹⁴

The proliferation of delivery systems is one of the critically important issues in the overall disarmament agenda. Delivery systems are an important part of weapons of mass destruction (WMD), in particular, nuclear weapons. Appropriate means of delivery are required to transport a nuclear weapon from its storage or deployment area to its target in a "militarily useful" way. Sophisticated delivery systems are costly and difficult to produce, and in many cases are the most visible part of a nuclear weapon. Therefore, the control of nuclear-capable delivery systems would be an important step to make nuclear weapons useless and reduce the threat of their use. This is especially true for ballistic missiles (BMs), which represent effective and powerful means to deploy nuclear weapons.

The new world situation has rendered the huge missile arsenals of the Cold War irrelevant and improved the conditions for effective missile controls. To reduce the missile threat and prevent destabilizing military reactions to missile proliferation such as ballistic missile defense, adequate control measures are needed. Restricting the means for delivery of WMD is essential to reduce the threat posed by such weapons. Effective control is complicated by the fact that a variety of delivery systems could potentially

¹³ The following is based on J. Scheffran, Nuclear Disarmament and the International Control of Delivery Systems, NWC Monitor, No.3, 2002; J. Scheffran, Elimination of Ballistic Missiles, in: J. Rotblat, M. Konuma (eds.), Towards a Nuclear-Weapon-Free World, World Scientific, 1997, 310-326.

¹⁴ Eliminating Nuclear Arsenals: the NPT Pledge and What It Means, speech by Jayantha Dhanapala to the All-Party Group on Global Security and Non-Proliferation, House of Commons, London, July 3, 2000. For full text, see Disarmament Diplomacy No. 47, June 2000.

be used. This includes rather sophisticated delivery systems like ballistic missiles, airplanes, cruise missiles, drones, and artillery, as well as a wide range of "low-technology" delivery systems -- such as civilian cars, aircraft, ships or even suitcases -- which can transport nuclear or other payloads. While control in the first category could effectively restrict the military value of WMD, control in the second category would have only a minor effect compared to the enormous efforts necessary. Therefore, it is reasonable to focus control on delivery systems which are explicitly designed for their military purpose and deal with the residual risk of low-tech means of delivery by other measures.

In the first category of specially designed delivery systems, experts emphasize the priority for control of the various delivery systems differently. Most attention has been focused so far on ballistic missiles, but for some observers the military effectiveness of ballistic missiles has been exaggerated compared to aircraft. According to a 1991 study of the Center for International Security and Arms Control (CISAC), "modern aircraft are, indeed, very capable and cost-effective alternatives for ground-missions." Compared to ballistic missiles, combat aircraft with equivalent capabilities are widely distributed across the globe. There are only a few hundred ballistic missiles with ranges beyond 300 km in the hands of developing countries, compared with many thousand military aircraft beyond this range. A growing number of countries have indigenous design and production capabilities, and a range of first-rate aircraft are for sale in the international market-place

Although the proliferation of land-attack cruise missiles is still at a very early stage, cruise missiles potentially pose a proliferation threat comparable to that of ballistic missiles and attack aircraft, and are deserving of more non-proliferation efforts. Cruise missiles could be easier to build than advanced attack aircraft or ballistic missiles, do not require highly trained pilots nor do they place pilots at risk, could be less vulnerable than airplanes to preemptive or suppressive attacks, and are potentially inexpensive compared to both ballistic missiles and attack aircraft. Using Global Positioning Satellite (GPS) guidance information, cruise missiles are potentially highly accurate (roughly 50 meters) and thus could be more destructive as conventional weapons than current ballistic missiles.

Compared to other nuclear capable delivery platforms, submarines can operate covertly, so that it is very difficult to monitor their location continuously. Due to stealth technology, long range (more than 10,000 miles), and ability to operate submerged for extended periods, submarines are potentially able to launch strategic or tactical nuclear weapons from close to the territory of an adversary. During the Cold War, nuclear weapons were widely deployed on nuclear powered submarines. Although non-nuclear weapon states and "threshold" states do not possess such nuclear-powered submarines, it is possible that modern conventional-powered submarines could play a decisive role in future military conflicts.

Compared to the variety of potential delivery systems for WMD, the present control regime is insufficient. The dominant approaches has been bilateral arms control and disarmament between the United States and Russia:

- The INF Treaty of 1987 removes the land-based intermediate-range nuclear forces of the US and Russia (including Cruise Missiles) with ranges of 500-5.500 kilometer.
- Both Strategic Arms Reduction Treaties (START) include a limitation of long-range missiles and bombers to 1.600 and a reduction of strategic warheads to 3.000-3.500.
- The Moscow Treaty (*Strategic Offensive Reductions Treaty*) of 2002 does not explicitly mention missiles but seeks to reduce the strategic warheads to 1.700-2.200 by end of 2012.

A few other agreements further restrain delivery systems:

- The 1972 ABM Treaty, which was abrogated by the Bush Administration in 2002, banned strategic missile defense systems for both superpower, including development, testing and deployment, which includes rocket-based components for that purpose.
- The Outer Space Treaty of 1967 bans the deployment of object in orbit which carry WMD.
- The conventions for the elimination of chemical and biological weapons also bans delivery systems designed for the use of these weapons.
- The UN Weapons Register of 1992 determines those weapons for which information has to be provided, including launchers and missiles with more than 25 km range.
- The agreements for nuclear-weapon-free zones in Latin America, South Pacific, Southeast Asia and Africa do not explicitly cover delivery systems if they are not an unseparable part of a nuclear weapon.

The current approach to curbing missile proliferation is the Missile Technology Control Regime (MTCR), which was initiated in 1987 with seven members. MTCR membership has grown to 34 countries.¹⁵ In addition, 7 countries have declared to abide by its rules. Although the MTCR has been successful in creating an international norm against missile exports and has delayed some missile programs, more significant accomplishments are impeded by problems and shortcomings. The MTCR is not a binding treaty, there are no specific verification or enforcement mechanisms, and membership is essentially restricted to the suppliers. Existing ballistic missile arsenals are not addressed, the asymmetry between 'haves' and 'have nots' is ignored, and various shorter-range missiles have been deployed in a number of developing countries.¹⁶ Strict export controls for dual-use goods undermine the civilian technology cooperation and economic interests in civilian space flight.

Because of these major deficiencies, supply-side controls need to be complemented or replaced by more cooperative, demand-side solutions that go beyond the MTCR. The most effective strategy against proliferation is to create an international norm against WMD by convincing all states to forgo the option of having WMD and related delivery systems. Appropriate measures include not only barriers such as export controls but global and regional disarmament, arms control and conflict resolution measures, security incentives as well as international economic and technology cooperation in exchange for giving up WMD.

Regional approaches for arms control could include CBMs like launch notification and exchanges of information, including establishment of data centers; conversion programs; common seminars on military forces and strategy; regional flight test bans; a freeze of R&D on missile technologies for military purposes. The importance of regional approaches to disarmament and confidence building was demonstrated in South America (Argentina and Brazil) and South Asia (India and Pakistan).

Since the different types of delivery systems are closely interrelated, it is insufficient to restrict control only to one means of delivery. As has been outlined in the 1995 INESAP Study "Beyond the NPT", an integrated approach is necessary that goes beyond the present regime. According to this study, a number of possible measures for limiting systems that could be used for nuclear delivery, could complement and facilitate the elimination of nuclear weapons (for ballistic missiles see the following chapter):

¹⁵ Siehe www.mtcr.info_projects.sipri.se/expcon/mtcr_documents.html.

¹⁶ See J. Scheffran, A. Karp, The National Implementation of the Missile Technology Control Regime: US and German Experiences, in: H.G. Brauch, H.J. v.d.Graaf, J. Grin, W. Smit (eds.), Controlling the Development and Spread of Military Technology, Amsterdam: VU University Press, 1992, pp. 235-255; D. Ozga, A Chronology of the Missile Technology Control Regime, in: The Nonproliferation Review, Winter 1994, S. 66-93; M. Smith, Efficiency and Inefficiency of the MTCR, in: INESAP Information Bulletin No.19, March 2002, S. 64-65

- *Cruise missile* non-proliferation efforts, such as the MTCR, should be continued and, if possible, expanded. However, it may be necessary to adopt arms control approaches that deal with the similarities between attack aircraft and cruise missiles, and between their underlying technology bases. Verification is difficult but not an insurmountable problem, as the INF Treaty proved.
- To prevent *military aircraft* proliferation, states could include limits on the numbers and capabilities of military aircraft in their regional arms control regimes. Even though currently unrealistic, a global ban on new types of combat aircraft would prevent both vertical and horizontal proliferation in a non-discriminatory way.
- To address the possibility that nuclear weapons could be deployed much more widely on *submarines*, a first step would be the creation of an international control regime, similar to the MTCR, focusing on technologies critical for advanced submarines. Joint naval task groups operated by the UN could monitor, and if necessary, control the operation of diesel submarines during crises.

Diplomatic initiatives are required to reduce the role of delivery systems in critical regions (Northeast Asia, South Asia, Middle East) and to develop an international norm against them some of them.

4 Building an international norm against ballistic missiles¹⁷

The most immediate candidate for control of delivery systems are ballistic missiles, which are perceived as especially threatening and provoke the development of ballistic missile defense systems. In the light of technical difficulties and the lengthy development periods for both ballistic missiles and missile defenses, there is a chance for political initiatives to contain the emerging missile race. A global missile threat from states such as North Korea or Iran does not yet exist, and will not materialise in the near term; nor will the United States have a working missile defense to deploy during the current presidency. Instead of rushing to join or counter a non-existent missile shield against a non-existent missile threat, the international community would be better advised to take joint action and collaborate on preventing a missile race on earth and in outer space, and promoting the disarmament of nuclear weapons and delivery systems. Diplomatic initiatives are required to reduce the role of ballistic missiles in critical regions (Northeast Asia, South Asia, Middle East) and to develop an international norm against ballistic missiles. As the dangers of an offense-defense missile race become imminent, the need for an international initiative to control ballistic missiles becomes more urgent. In the past five years a number of potentially significant initiatives on missile control have been launched:

- Russia and the USA operate a system for the monitoring of missile tests since more than three decades. With the 1971 *Accidents Measures Agreement* both sides were required to notify certain missile tests in advance, which has been specified by additional agreements (*Incidents at Sea Agreement*, SALT-II). In 1988 a more comprehensive system for ballistic missile launches was established which required notification of launch time and location for ICBMs as well as the intended target area. These data were transmitted to the newly established crisis reaction center. Missile launches were monitored by radar facilities on the ground (such as the US Ballistic Missile Early Warning System), at sea and in the air. In the early 1990s the idea of a multilateral missile monitoring system was discussed, in the context of the proposal for a *Global Protection Against Limited Strikes* (GPALS). During the millennium fever 1999 both sides established a joint early warning center, and in the following year Presidents Clinton and Jelzin established the *Joint Data Exchange Centre* (JDEC) in Moscow to facilitate transparency and data exchange about launches of ballistic missiles with more than 500 km range, including those from other

¹⁷ This chapter builds on: J. Scheffran, Moving Beyond Missile Defense: The Search for Alternatives to the Missile Race, Disarmament Diplomacy, Issue No 55, March 2001, 21-26. A. Lichterman, Z. Mian, M.V. Ramana, J. Scheffran, Beyond Missile Defense, INESAP Briefing Paper No.8, March 2002; also published by Global Resource Action Center for the Environment, New York, Oct. 2002. J. Scheffran, Rüstungskontrolle bei Trägersystemen, in: G. Neuneck, C. Mölling (eds.), Die Zukunft der Rüstungskontrolle, Nomos, 2005, 354-366.

countries. Signed on December 16, 2000, the US-Russian Memorandum of *Understanding on Notification of Missile Launches* provides for pre- and post-launch notification of all ballistic missile tests and space launches, as well as notification of failed satellite launches. Other countries could join the agreement.¹⁸ Even though this memorandum did not find the support of the Bush Administration, the JDEC in Moscow was continued.

- A related initiative has been the Russian proposal for a Global Control System (GCS) for the non-proliferation of missiles and missile technology. A *Global Monitoring System (GMS)* would increase transparency with regard to missile launches and reduce the risk of miscalculation or misunderstanding. Such a regime could include controls on missile and missile technology transfers to third countries and provide prior notification of test launches of ballistic missiles and space launch vehicles. In order to discourage proliferation, the GCS would offer security incentives to abstain from missile development and assistance in the peaceful uses of space for states that completely give up and convert their missile programs and capabilities.¹⁹ Launched in 1999 and further explored at several expert level meetings in Moscow,²⁰ the proposal acknowledges the security concerns raised by missile programs and the need for security assurances. Despite the participation of 71 countries, including North Korea, the initiative did not lead to concrete results in face of opposition from the US government who saw GCS as a vehicle against the missile defense plans.
- There is an evident need to strengthen the MTCR by developing and enhancing confidence-building measures (CBMs) among states with missile capabilities. During the 1999 MTCR Plenary in Noordwijk, Netherlands, the missile suppliers discussed voluntary commitments to "responsible missile behaviour", without publicly explaining their meaning. At the conference in The Hague in November 2002 states agreed on an *International Code of Conduct (IcoC) Against Missile Proliferation*, including a set of principles, commitments, CBMs and incentives to contain and delegitimize missile proliferation.²¹ The *Hague Code of Conduct (HCoC)* remained below expectations and comprises various general principles, moderate obligations and limited CBMs such as the annual statements on missile policy and the notification of missile launches which should include information on the general class of ballistic missiles or space launchers, the time and area of location and the planned light direction. This can be complemented by voluntary information on the type and purpose of a launch and the target area. The possession of missiles is not prohibited and the intended reduction of national missile arsenals remained vague. Noting was left of the originally planned "responsible missile behavior", which raised the concern that the main purpose was to stop proliferation but not question the existing missile arsenals which would discriminate newcomers. There is neither a formal Secretariat nor an implementing organization. By January 2004 HCoC was supported by 111 States, including the United States.

18 J. Steinbruner, *The Significance of Joint Missile Surveillance*, An Occasional Paper of the Committee on International Security Studies, Boston: American Academy of Arts and Sciences, July 2001; Memorandum of Agreement Between the United States of America and the Russian Federation on the Establishment of a Joint Center for the Exchange of Data from Early Warning Systems and Notifications of Missile Launches, June 4, 2000, www.state.gov/t/ac/trt/4799.htm; Memorandum of Understanding on Notification of Missile Launches, Bureau of Arms Control, Dept. of State, Dec 16, 2000, www.state.gov/t/ac/trt/4954.htm.

19 Global Control System for Non-Proliferation of Missiles and Missile Technologies. Concept, Discussion Review and Follow-up Steps', February 15, 2001. See also V. Abrosimov, 'Preventing Missile Proliferation: Incentives and Security Guarantees', *Disarmament Diplomacy* No. 57, Mai 2001, 4-8.

²⁰ For details of the first experts-level meeting, see M. Rice, *Russia Proposes Global Regime On Missile Proliferation*, *Arms Control Today*, May 2000; for the second meeting, see *Disarmament Diplomacy* No.54, February 2001. An unofficial collection of documents can be found on the website of the Federation of American Scientists, www.fas.org/nuke/control/mtcr/news/GSC_content.htm.

²¹ The HCoC text can be found at www.acronym.org.uk/docs/0211/doc13.htm together with other documents. See also: M. Smith, *Stuck on the Launch Pad? The Ballistic Missile Code of Conduct Opens for Business*, *Disarmament Diplomacy* 68, Dec. 2002/Jan 2003, S. 2-6; M. Smith, 'On Thin Ice: First Steps for the Ballistic Missile Code of Conduct', *Arms Control Today*, July/August 2002, 9-13.

- In October 2000, Iran introduced a resolution on missiles to the 55th session of the UN First Committee which was adopted (A/C.1/55/L.1/Rev.1). The resolution emphasizes the "need for a comprehensive approach towards missiles, in a balanced and non-discriminatory manner, as a contribution to international peace and security." It requests the Secretary-General, with the assistance of a panel of governmental experts, to prepare a report on missiles in all its aspects. After three meetings of the UN Panel of Governmental Experts (UNPGE) on Missiles presented its final report in 2002.²² The report summarized basic aspects of missile development and listed the existing agreements in this field, but because of large divergences in the panel over the threat assessment no recommendations were made. Useful is the definition: "A missile is an unmanned, self-propelled, self-contained, unrecallable, guided or unguided vehicle designed to deliver a weapon or other payload. A ballistic missile is a weapon-delivery vehicle that has a ballistic trajectory over most of its flight path." The report emphasizes the large diversity of missiles and estimates the total number of missiles worldwide as 120.000, compared to 35.000 at the end of the Second World War. In September 2002, the establishment of a second working group was adopted.

All these initiatives fell short of the initial promises and expectations. Conflicting interests of the missile powers and in particular the lack of interest of the Bush Administration in multilateral arms control lead to minimal consensus which watered down the original intentions and did not restrain missile programs. The link between ballistic missiles and space launchers was recognized as a problem. In none of the initiatives was the disarmament or elimination of ballistic missiles seriously considered. Countries like Canada, which in 2000 pushed for strengthened missile controls, gave in to the pressure from Washington.²³

While progress among governments remains slow, it is important to think ahead towards a more comprehensive international missile control regime that takes into account the various stages of missile development, and the asymmetries among missile owners. As missile development advances, the potential threat increases. Once a missile has been tested, bans on deployment will be more difficult - since rapid breakout from an agreement remains possible - and will require stricter controls. Strengthening international ballistic missile controls will be a long-term process necessarily involving the adoption and evolution of a wide range of measures, from comparatively modest measures - i.e. a Code of Conduct, bolstered export controls, and missile monitoring and launch-notification agreements - to far-reaching disarmament treaties establishing global missile disarmament. Intermediate options would include restrictions on missile testing, and the creation of missile-free zones. Obvious candidates for such areas would be Latin America and Africa, both of which have established nuclear-weapon-free zones.

A missile non-proliferation regime, allowing missile owners to keep their arsenals, would have limited efficiency compared to non-discriminatory missile disarmament. The only way to deal with asymmetries between countries would be to set up an international norm against ballistic missiles that entitles all countries to equal rights. To build momentum for a comprehensive alternative, a step-by-step approach is appropriate which keeps the long-term goal in mind. Initial steps could be risk-reduction and confidence-building measures, such as de-alerting, improved ballistic missile early warning and launch notification. The monitoring and surveillance of missile and space-related activities and the exchange of technical data would support an effective missile-control verification system.

22 The issue of missiles in all its aspects, UNGA A/57/229, July 23, 2002. On the work of the expert group see Lee Ho Jin, Observations and lessons from the work of the Panel of Governmental Experts on Missiles, in: UNIDIR Disarmament Forum, 3-2003, S. 67-70; W. Pal S. Sidhu, C. Carle, Managing Missiles: Blind Spot Or Blind Alley?, in: Disarmament Diplomacy, No. 72, August - September 2003.

²³ Ballistic Missiles Foreign Experts Roundtable Report, March 30-31, 2000, Canadian Centre for Foreign Policy Development, April 7, 2000; The Missile Defense Debate: Guiding Canada's Role, Liu Centre for the Study of Global Issues, 2001. For a report on the consultation see www.liucentre.ubc.ca/report/Defensereport.html.

Test restrictions would effectively prevent new missile designs and limit modification of traditional technology, although unsophisticated indigenous missile systems could still be developed and deployed with minimal testing. A ballistic missile flight-test ban would preclude the testing of new missiles and reduce the chance of accidental or intentional war. In order to prevent a missile race and buy more time for political initiatives, it would be helpful to institute a moratorium on the further development, testing and deployment of ballistic missiles. To address concerns about asymmetries and discrimination, a 'missile freeze' could cover offensive and defensive missiles and be designed as a temporary measure while countries negotiate disarmament steps for missiles and other delivery systems. Simultaneous regional security initiatives would be crucial to diminish incentives for missile development.

When planning next steps, long-term perspectives should be taken into account. In 1992, expanding the proposal discussed between Ronald Reagan and Mikhail Gorbachev at the 1986 Reykjavik Summit, the Federation of American Scientists (FAS) developed a model for the elimination of ballistic missiles (ZBM: Zero Ballistic Missiles).²⁴ Such a regime would aim at the complete elimination of offensive ballistic missiles and combine unilateral declarations with regional and global multilateral agreements. The ZBM proposal - which the FAS backed up with a complete draft treaty - combined a comprehensive framework with a stepwise approach, including bilateral cuts between the USA and Russia, ballistic-missile-free zones, an international Missile Conference, the creation of an International Agency for Ballistic Missile Disarmament, and finally agreement on the varying schedules necessary to reach zero ballistic missile capability.

The case for a regime to control and monitor space launchers is greatly strengthened when considered in the context of preventing an arms race in outer space. Such a regime, in fact, could serve the function of verifying a ban on space weapons, in particular anti-satellite (ASAT) weapons. Since man-made objects in orbit would enter space through space rockets, a monitoring system at space launch facilities could not only search for indications of ballistic missile use, but also for the space-weapon usability of the payload. This would provide increased transparency concerning space activities in general, and would effectively exclude the deployment and testing of space weapons using ground-based space launchers. Other types of space weapons, in particular aircraft launch and ground- or air-based beam weapons, require different verification provisions. A combination of the available technologies would provide quite efficient means for verifying an ASAT ban, including a test ban, and the remaining risk would certainly be no higher than if the situation remained uncontrolled.²⁵

A control regime on ballistic missiles and space weapons could be also extended to the international control of ballistic missile defenses, reversing the abrogation of the Bush Administration from the ABM Treaty in 2002. The terms of a new treaty could be made more precise and verifiable, and/or be internationalized. Such limits would relate to the altitude, relative distance and velocity of interceptor tests, and to limits on laser brightness or to the aperture of sensors and mirrors.²⁶

²⁴ Revisiting Zero Ballistic Missiles - Reagan's Forgotten Dream, FAS Public Interest Report, May/June 1992; L. Lumpe, Zero Ballistic Missiles and the Third World, *Arms Control*, Vol.14 (1), April 1993, pp. 218-223; A. Frye, Zero Ballistic Missiles, *Foreign Policy*, No.88, Fall 1992, 12-17.

²⁵ For a summary of the basic options and technical problems, see J.Scheffran, Verification and Risk for an Anti-Satellite-Weapons Ban, *Bulletin of Peace Proposals*, Vol.17, No.2, 1986, pp. 165-174, the analysis for which was conducted in the context of: H. Fischer, R. Labusch, E. Maus, J. Scheffran, Draft Treaty on the Limitation of the Military Use of Outer Space, reprinted in: J. Holdren, J. Rotblat (eds.), *Strategic Defenses and the Future of the Arms Race*, New York: St. Martin's Press, 1987.

²⁶ J. Pike, Quantitative Limits on Anti-Missile Systems - A Preliminary Assessment, Washington D.C.: FAS, 4th, May22, 1987; a shorter version can be found in: *Scientific Aspects of the Verification of Arms Control Treaties*, part II, pp. 137- 198, *Hamburger Beiträge zur Friedensforschung und Sicherheitspolitik*, June 1987.

5 International space law and space security²⁷

Outer space: heritage of mankind or new war zone?

Space is increasingly used for a variety of purposes, including the military use of satellites for information gathering and transmission, which leads to a growing dependence on space objects. Contrary to the factual military use of space, the international community has always expressed a strong desire to preserve space for peaceful purposes, and in the beginning this included the United States. In 1957, US Ambassador John Cabot Lodge submitted a memorandum on arms control in space to the United Nations, which proposed the establishment of a multilateral disarmament control system with international inspections and participation of all states to ensure that future developments in outer space are directed exclusively towards peaceful and scientific purposes. In 1958 the “National Aeronautics and Space Act (NASA Act)” explicitly states “The Congress hereby declares that it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind.”²⁸

Despite fierce competition in the Cold War, which extended to outer space, the large majority of states agreed to the cornerstone of international space law, the 1967 “Outer Space Treaty” (OST),²⁹ with additional agreements on outer space negotiated subsequently. The countries which signed the OST agreed to use space for peaceful purposes, in the interest of mankind. The establishment of military bases, installations, and fortifications on the moon and other celestial bodies is prohibited as are weapons of mass destruction in Earth orbit, but not the deployment of weapons in outer space. The essential legal term “peaceful” has not been defined, leaving room for a wide range of interpretations, from “non-military” to “non-aggressive”,³⁰ and now even “offensive,” stretching the meaning of “peaceful” beyond recognition.

The military use of space has become even more relevant in the course of time, but the weaponization of space can still be prevented. In addition to being reserved “exclusively for peaceful purposes,” outer space is an essential and vulnerable part of Earth’s environment and needs to be protected against activities that spoil or exploit it, such as creating space debris by military activities and weapons tests. Connected to this is the right of the international community to space security, i.e. protection against threats in space and from space. International legal norms support a cooperative approach towards space security, jointly preventing threats and associated risks. The effectiveness of an international legal norm is measured by the degree of risk reduction it provides as compared to an unregulated situation in which countries take unilateral military action. There are good arguments why an unregulated situation creates more security risks for all states, including the United States. The imperative of power projections towards space dominance is contrary to the principle of space as a “common heritage of mankind,” which should not be subject to conflict, private ownership, or national appropriation.³¹ These principles are

²⁷ This chapter relies on R. Hagen, J. Scheffran, International Space Law and Space Security, in: M. Benkö, K.-U. Schrogl (Eds.), *Space Law: Current Problems and Perspectives for Future Regulation*, Eleven International Publishing, 2005, 273-301; J. Scheffran, Risk reduction and monitoring in outer space, in: *Safeguarding Space for All: Security & Peaceful Use*, UNIDIR Geneva, UN Press, 2005; J. Scheffran, Options for Rules in Outer Space, *INESAP Information Bulletin*, No.20, August 2002, 9-14.

²⁸ Section 102(a) National Aeronautics and Space Act (NASA Act), Public Law 85-568, 85th Congress, First Session, H.R. 12575, 29. July 1958; www.hq.nasa.gov/ogc/spaceact.html as amended.

²⁹ www.oosa.unvienna.org/SpaceLaw/outersptxt.html.

³⁰ For more details, see: H.-J. Heintze, Peaceful Uses of Outer Space and International Law, in: W. Bender, R. Hagen, M. Kalinowski, J. Scheffran (eds.), *Space Use and Ethics*, Münster: agenda, 2001, pp. 243-250.

³¹ K.-U. Schrogl, Space Law and the Principle of Non-Appropriation, in: Wolfgang Bender, op.cit., pp. 251-253. On space privatization see: J. Scheffran, Privatization in outer space, in: E. U. von Weizsäcker, O.R. Young, M. Finger (eds.), *Limits To Privatization, A Report to the Club of Rome*, London/Sterling, VA: Earthscan, 2005, pp. 79-83.

enshrined in the OST, according to which the use of space “shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.”

The desire for peaceful space use is reflected in numerous resolutions of the United Nations General Assembly and has been a main motive of the work of the UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS), where international space law has been developed. Dealing with the military use of space remains the responsibility of the Conference on Disarmament (CD) in Geneva but the permanent stalemate at the CD on this issue has hampered any progress on arms control in space.³²

For more than two decades, the UN General Assembly has adopted resolutions on the “Prevention of an Arms Race in Outer Space” with overwhelming majority, with only the US and one or two small states abstaining.³³ Annually since 1984, these resolutions emphasized that for the prevention of an arms race in space further control measures with effective verification provisions are necessary. In addition to governments and the United Nations,³⁴ international civil society has also actively participated in discussions and projects on the prevention of a space weapons race.

A key question is whether the transition from the *militarization* to the *weaponization* of space can be prevented. In the past 60 years, there have been numerous attempts to open the “high frontier” for “space warfare”, to the point of calling for weapons to project force “to, from, in and through” space. As yet, the efforts to research, develop, and test various kinds of space weapons have not led to operational systems. One of the main reasons for the slow “progress” in weaponizing space is the difficulty in carrying out the ensuing tasks. Development of the required technologies is very costly and turns out to take much longer than anticipated. In addition, decision-makers encounter strong opposition from the international community and their own population to transform space into another war zone. Keeping space for peace, a sanctuary that is worthy of protection, is an appealing concept for many states and individuals.

As outer space has been widely acknowledged as a common heritage of mankind, which should be used for the benefit of *all* countries, the international community has long been calling for the prevention of an arms race in outer space, seeking to strengthen international space law and arms control in space by introducing provisions against the weaponization of space. In spite of these efforts, current space law has still severe shortcomings which restrict its effectiveness. For instance, the term “peaceful” has never been clearly defined in the space context and has over time taken a different meaning (from “peaceful” to “defensive”, subsequently to “non-aggressive” and now even “preventive”). Lacking a generally acknowledged definition for “outer space”, it is often assumed to be approximately 100 km above sea level.³⁵ Similarly, the international community could never agree on a definition of what constitutes a “space weapon”. Dual-use –exemplified not only in space-weapons capabilities of missile defense components but also in the inherent civil-military ambivalence of space technology such as rockets and satellites – adds to the complexity of the problem. One possibility is to define them as “systems based either terrestrially or in space for antisatellite missions; or systems based in space designed to attack terrestrial targets.”³⁶

³² C. Singer, Space Weapons and the Conference on Disarmament, INESAP Information Bulletin, No. 20, August 2002, pp. 25-26.

³³ See www.oosa.unvienna.org/SpaceLaw/gares/index.html for access to all UNGA resolutions on outer space.

³⁴ Of particular interest is the joint effort of China and Russia to promote discussions on a space weapons ban at the Conference on Disarmament. For details, www.reachingcriticalwill.org/legal/paros/parosindex.html.

³⁵ Definition Issues Regarding Legal Instruments On the Prevention of the Weaponization of Outer Space. A Non-Paper by Chinese and Russian Delegations to the Conference on Disarmament, 9 June 2005; www.reachingcriticalwill.org/political/cd/speeches05/June9/ChinaRussianonpaper.pdf.

³⁶ T. Hitchens, Update on U.S. Military Space Policy and Strategy, 8 June 2005; www.cdi.org.

From risk reduction to a space weapons ban

Space objects are designed for a hostile space environment that is characterized by vacuum, radiation, temperature extremes and a limited energy supply. They also must survive the strains of launch and sometimes the stress of re-entry. Space systems can fail as a result of a variety of reasons: component failure and degradation; design, development, production, programming or mission errors; interruption of ground communication caused by accidents, jamming or ground attacks; collision with space debris; physical attack; blinding of sensors; hacking; deception; or hijacking. In a concrete case, it might be difficult to trace a system failure back to a specific cause, which in many cases could be space debris. Vulnerabilities and threats would be considerably increased with advanced space weapons, such as manoeuvrable satellites, space mines, micro-satellites, kinetic kill vehicles, chemical and nuclear explosives, or particle, microwave and laser beams. They would contribute significantly to the complexity and instability of the strategic situation, which ultimately would not serve the security interests of any country, including the United States.

To some degree, the survivability of space objects against some of the potential attacks can be increased by passive or active protection measures. Some of these measures are costly and do not provide security against all kinds of attacks and technologies. For the most important satellites in the United States, some or all of these measures have already been implemented. Within the existing framework of international space law, confidence-building measures can contribute to stabilizing international security including:

- advanced notification and more detailed information about space launches and experiments (for example, with lasers);
- establishment of a crisis hotline between major missile and space powers;
- a code of conduct for responsible space behavior, learning from the ongoing process of the Missile Technology Control Regime (MTCR);³⁷
- improved international monitoring system and information exchange; and
- strengthened international space cooperation that improves transparency and reduces incentives for indigenous space development.

In addition, rules of the road could be agreed for outer space:

- keep-out-zones, minimum flyby distances and speed limits around satellites to increase warning time against attack and reduce efficiency of attack;
- satellite immunity and non-interference with satellites; and
- reduction of space debris.

A combination of satellite hardening, confidence building and rules of the road might better protect satellites against existing residual (non-dedicated) space threats such as attacks with intercontinental ballistic missiles (ICBMs) and manoeuvrable satellites, with radio or laser beams not explicitly developed for weapon purposes. High-altitude nuclear explosions are a severe risk for all electronic components in space, not just from direct impact but even more so from captured radiation in the Van Allen radiation belt.

If dedicated space weapons based on new technologies are developed, the existing regime would not be sufficient to substantially diminish the emerging threats. Additional risk reduction could be achieved by partial arms control measures, which by agreement would restrict or ban certain kinds of weapons or weapon uses. These could include the following.

³⁷ In 2004 the Stimson Center, with US NGO experts, drafted a Model Code of Conduct for Responsible Space Faring Nations. The full text of the Model Code of Conduct can be found at www.stimson.org/space.

- A ban on testing, deployment and use of weapons above a specific altitude would relegate weaponization to low-Earth orbits and keep the remaining outer space a weapon-free zone. Possible altitudes range from 500 km to 5000 km in order to protect space objects beyond that range. Protecting high-orbit navigation satellites and geostationary communication and early warning satellites is of greatest importance to military and commercial interests. However, allowing weapons development in low-Earth orbits could open the door to space weaponization, and it would not preclude the development of sophisticated low-Earth orbit weapon systems that could later be extended to higher orbits.
- The legal and physical protection of manned missions and the prohibition of manned military space operations could prevent people from being involved in space warfare. Most important, it would protect manned space stations by maintaining keep-out zones and shielding them against space debris and some forms of attack.
- Certain types or deployment modes of space weapon systems and technologies could be banned—in particular, ASAT or BMD systems, or weapons with a predominantly offensive role. Laser and other kinds of beam weapons could be excluded, whether ground-based or space-based. Small satellites below a specific size limit (e.g. 10cm) or weight limit (e.g. 10kg) could be restricted.
- States could restrict particular stages in the life cycle of a weapon such as research, development, testing, production, deployment or use. For example, an ASAT testing moratorium has been established in the mid-1980s between the United States and the Soviet Union. A ballistic missile flight test ban was also discussed at that time.
- Specific limits on interception speeds and altitudes or the size of mirrors and power levels could be agreed.
- Partial arms control measures could be embedded into more comprehensive arms control regimes in space, including a global ban on weapons against objects in space and from objects in space against any target.

Comprehensive space arms control would seek to ban certain kinds of weapon systems completely at an early stage to effectively prevent an arms race in space before these weapons are tested or become operational. A comprehensive arms control regime has the advantage of being politically comprehensible and attractive to the general public. Such regimes require an unprecedented degree of cooperation and, given the current political circumstances, would be resisted by the US government.

A global ban on weapons against objects in space and from objects in space against any target would prohibit development, testing, and deployment of such systems. In the past two decades, various proposals, both from governments and non-governmental organizations, have been suggested and discussed. Of particular interest are: the Soviet proposal of 1983; an ASAT ban proposal of the Union of Concerned Scientists of the same year; and the Draft Treaty on the Limitation of the Military Use of Outer Space proposed by German scientists in 1984.³⁸ More recent is a proposal for a space weapons ban introduced to the Conference on Disarmament by China and Russia in 2002 and the Space Preservation Act introduced by US Congressman Dennis Kucinich in 2002 (and since re-introduced several times including in May 2005).³⁹

³⁸ See: H. Fischer, R. Labusch, E. Maus, J. Scheffran, Entwurf eines Vertrages zur Begrenzung der militärischen Nutzung des Weltraums, in: R. Labusch, E. Maus, W. Send (eds.), *Weltraum ohne Waffen*, München, 1984, pp. 175-187. For the English version see: Treaty on the Limitation of the Military Use of Outer Space, in: J. Holdren, J. Rotblat (eds.), *Strategic Defences and the Future of the Arms Race*, New York, 1987. The text is reprinted in: INESAP Information Bulletin No.20, August 2002; www.inesap.org/bulletin20/bul20art19.htm. The Draft Treaty was debated in autumn 1984 in the German Parliament and found support from the SPD and Green Party but was opposed by CDU/CSU and FDP.

³⁹ Several of these treaty proposals have been documented in INESAP Information Bulletin No. 20, August 2002; www.inesap.org/bulletin20.htm.

The goals and principles of the Göttingen treaty proposal are still relevant today:⁴⁰

1. All channels for an arms race in space are to be closed.
2. Destabilizing developments shall be prevented; space must remain free of weapons.
3. Stabilizing functions and peaceful uses of space should not be undermined.
4. The treaty elements should be structured step-by-step according to their urgency.
5. The draft treaty should be politically feasible and beneficial to all member parties.
6. To ensure transparency of the treaty and avoid misunderstandings, treaty articles should be explained.
7. The treaty terms shall be adequately verifiable.
8. Cooperation and confidence-building shall be emphasized and supported.
9. The proposal shall be multinational to reflect the international character of space-flight.
10. The continuity of existing treaties shall be ensured.

Clarity about some important dimensions of a treaty and its range of options help to determine the treaty scope. Examples are:

1. Military function of system to be controlled (ballistic missile, cruise missile, space launcher; BMD; ASAT; satellite; aircraft; command, control, communication and intelligence (C3I); weapon of mass destruction);
2. Scope of agreement (universal, global, multilateral, regional, bilateral);
3. Actions to be taken (limit, prohibit, eliminate, inform, promote);
4. Object to be influenced (number, physical parameters, location, operation and maintenance, complete systems, components/materials, facilities, processes); and
5. Phase in weapon life cycle (research & development, production, testing, storage, transfer, deployment, use, shutdown).

Banning space weapons would focus on those systems that are “specially designed” to destroy space objects (including ASATs on the ground, on the sea, or in the air) and space objects themselves which are specifically designed to destroy other targets regardless of their basing mode. While this does not resolve the problem of dual use-capable systems, it would exclude a large class of the most threatening systems and activities. A residual risk from non-dedicated systems (such as maneuverable satellites or rockets) remains, but this problem exists in all arms control treaties and needs to be dealt with by a set of measures to reduce these residual risks (including satellite hardening, improved monitoring, security concepts, etc). A comprehensive approach could integrate risk reduction measures and partial agreements in a phased step-by-step approach, as has been discussed in incremental-comprehensive approaches to nuclear disarmament. For each step, efforts and benefits must be balanced. The overall concept has to be chosen in a way that best serves space security.

As pointed out by Detlev Wolter, the peaceful use of space is an essential cornerstone in the concept of “common security” in outer space, which includes the following measures:⁴¹ “the prohibition of active military uses of a destructive nature in the common space; a comprehensive package of confidence-building measures with multilateral satellite monitoring and verification systems as well as a protective regime for peaceful space objects based on immunity rules for satellites, such as a ‘rules of the road’ and a ‘code of conduct’.” He suggests to negotiate a multilateral “Treaty on Common Security in Outer Space” (CSO Treaty) as the adequate mechanism to implement the Outer Space Treaty. This should be accompanied by the establishment of an International Organisation for Common Security in Outer Space which will be tasked with monitoring the implementation of the agreement.

⁴⁰ Further evaluation can be found in: J. Scheffran, Verification and Risk for an Anti-Satellite-Weapons Ban, Bulletin of Peace Proposals, Vol. 17, No. 2, 1986, pp. 165-174; J. Scheffran, The Göttingen Proposal for a Space Treaty, www.inesap.org/bulletin20/bul20art20.htm.

⁴¹ D. Wolter, Grundlagen “Gemeinsamer Sicherheit” im Weltraum nach universellem Völkerrecht, Duncker & Humblot, 2003, p. 16; English edition forthcoming in 2005.

6 Principles of verification and enforcement⁴²

An arms control treaty will only be effective if it can be adequately verified and enforced, both in political and technical terms. Verification policies should be designed to assure early detection and interpretation of information necessary for the prevention of prohibited activities or permitting timely response. It is useful to refer to some general principles of adequate verification.⁴³

1. Disarmament and verification should enhance international security and stability and reduce risks, compared to an unrestrained arms race or war.
2. Verification is a comprehensive iterative process, including political, legal, diplomatic, technical and military dimensions, for judging the compliance with international law, containing the risk of cheating and increasing time for adequate response.
3. The verification process aims at an approximate balance between those provisions that are to be verified (tolerance threshold) and those activities that can be verified (monitoring threshold).
4. The demands, requirements and costs of verification shall be adapted to the relevance of treaty provisions and the associated risk of cheating.
5. Because existing verification means are not perfect, the residual risk needs to be reduced to tolerable levels by adequate responses, offsetting eventual military threats by and advantages for the cheater.

According to these principles it becomes clear that the verifiability of a treaty is not an absolute issue, but a matter of degree depending on political assumptions and requirements as well as the available resources and capabilities for verification. Most crucial is the question on "tolerable" degrees of verifiability and their associated residual risks. For the Reagan Administration, for instance, nothing short of 100 percent certainty that the Soviets were not cheating was tolerable. Since this was an impossible standard to achieve with limited verification efforts, the requirement prevented any progress on disarmament. With Gorbachev, however, confidence and trust increased between the superpowers, and finally even Reagan accepted much lower verification standards in order to conclude the INF and START treaties. More verification was seen as too costly, and the residual risks were accepted because the potential security implications were perceived as manageable. Thus, between friendly nations even the lowest standards of verification could be tolerable because the incentive and probability of cheating seem negligible. In consequence, with increasing trust and cooperation between nations the need and costs for verification become more and more irrelevant.

As long as there is a gap between the tolerance threshold and the monitoring threshold, either the verification capabilities are to be improved, depending on the available resources, or the political requirements are to be reduced to achieve the desired security gains by the treaty within the given

⁴² This chapter builds on J. Scheffran, Content and Verification of a Nuclear Weapons Convention, in: J. Rotblat (Ed.), *Remember Your Humanity*, Singapore: World Scientific, 1999, 318-334. Further aspects of verification, including those for nuclear, missile and space arms control, are discussed in: J. Scheffran, *Verification and Stability - The Strategic Impact of Uncertainties and Perceptions*, in: H.-G. Brauch (ed.) *Verification and Arms Control Implications for European Security*, Part II, Mosbach: AFES-PRESS 1990, 191-196; J. Scheffran, *Verification of Ballistic Missile Bans and Monitoring of Space Launches*, in: W. Liebert, J. Scheffran (eds.), *Against Proliferation Towards General Disarmament*, Agenda 1995, 156-164; M. Datan, J. Scheffran, *Principles and Means for Verification of a Nuclear Weapons Convention*, INESAP Information Bulletin, No.14, November 1997, 21-24; M.B. Kalinowski, W. Liebert, J. Scheffran, *Beyond technical verification. Transparency, verification, and preventive control for the Nuclear Weapons Convention*, in: M.B. Kalinowski, *Global Elimination of Nuclear Weapons*, Baden-Baden: Nomos, 2000, 61-68; R. Hagen, J. Scheffran, *Is a space weapons ban feasible? Thoughts on technology and verification of arms control in space*, UNIDIR Disarmament Forum, 1/2003, 42-51.

⁴³ Such principles have been outlined in J. Scheffran, *Verification and Risk for an Anti-Satellite-Weapons Ban*, *Bulletin of Peace Proposals*, Vol.17, No.2, 1986, pp. 165-174 .

resource limits. Thus, verification means measuring the difference between the actual situation (where we are) and the desired situation (where we want to be), and the agreed path connecting both. This implies that the agreed path is to be defined as precisely as possible and that the actual situation is measured as exactly as necessary and possible. Agreement on the path is subject to negotiations in which the interests of the various negotiators are to be balanced. If the actual path deviates from the agreed path more than tolerable, then the verification system should provide a timely alarm. Thus the following questions are to be considered for the verification process:

- Which agreed states, items and activities should be achieved, limited or prohibited during given periods with a given confidence and certainty (what are the requirements/tasks of verification)?
- Which verification measures could be applied to monitor actual states and activities (what are the means of verification)?
- Can an intolerable deviation from agreed states, items and activities be detected in time with reasonable verification efforts (what are the benefits, costs and risks of verification)?

The tasks of verifying legal obligations can be divided into the following three main stages:

1. *Baseline information exchange and data gathering*: Identify the current status of the nuclear-weapons complex with reasonable accuracy without proliferating sensitive information.
2. *Disarmament*: Monitor the agreed path of reducing arms and eliminating the associated weapons complex within tolerable limits of uncertainty and sufficient confidence.
3. *Prevent rearmament*: During the disarmament process observe any objects and detect any activities that might indicate a weapons capability.

Verification in all three stages would need to focus on monitoring a complex range of treaty-limited items (objects), treaty-limited states and processes (activities), and their combination. What actually needs to be verified is the combination of required/prohibited objects and activities (represented by a two-dimensional matrix). For the Nuclear Weapons Convention, for instance, these include dismantlement of nuclear weapons; disposition of nuclear material; conversion or destruction of certain nuclear facilities; monitoring the location and status of nuclear weapons, nuclear material, nuclear facilities, delivery systems, command and control systems to insure that they are not used for research, development, testing, production, transport, deployment or use of nuclear weapons. Other activities would include storage, transfer and handling of nuclear weapons and fissile material.

According to Steve Fetter, the disarmament and verification process is iterative: *"Parties agree to reductions on the assumption of shared goals; the verification of these reductions builds confidence between the parties in that assumption, making increased transparency and deeper reductions possible."*⁴⁴ Thus, verification is a dynamic process with the four phases of declaration, monitoring, inspection and enforcement being repeated successively, but also in parallel:

- 1. Declaration and registration** provides the necessary information of the initial situation as a starting point for verification to allow comparison with any future changes, either agreed or prohibited. All treaty-limited items are tagged, identified and registered.
- 2. Monitoring** aims at detecting prohibited objects or activities. Continuous monitoring requires information gathering over larger units of time. Remote sensors on satellites and aircraft provide monitoring of large areas. Such sensors can detect larger objects, in particular transport vehicles and buildings. The problem, of course, is to identify treaty-limited items among the vast number of existing civilian and military objects. However, regular cartographic mapping provides a basis to compare with remote sensing and detect irregularities/inconsistencies between official mapping information and actual

⁴⁴ S. Fetter, *Verifying Nuclear Disarmament*, Washington, DC: Henry L. Stimson Center, Occasional Paper No. 29, October 1996.

remote sensing data. Although there is no absolute certainty, there is a chance that suspicions on prohibited objects and activities are raised.

3. Inspection: As soon as a suspicion on a treaty violation is raised, the inspection mechanism is applied to check whether it is justified or not. During inspections, the inspectors could request all the necessary detailed information from the inspected party, including the opening of rooms, access to computer code and interviews with personnel and neighbors. In addition, a wide range of non-destructive on-site monitoring devices (like portal perimeter controls) could be applied to understand the structure and function of equipment. Cooperation and consultation within the International Agency could help in gaining and proving the information.

4. Negotiation/Enforcement: If sufficient information has been gathered to prove a treaty violation then enforcement mechanisms could be applied (this could already be the case if a country refuses access for the inspection which would be an indicator of non-compliance). The first step would be to demand from the suspected violator the ending of prohibited activities in a verifiable way or to destroy or convert prohibited objects. If the object or activity of concern is to be excluded from nuclear weapons use, additional preventive controls are applied. If the (suspected) cheater refuses any of these measures, a negotiation process is started, taking the concerns and motivations of the cheater into consideration, explaining the gains in case of cooperation, and pointing to the possible coordinated actions of the international community, including economic sanctions, exclusion from cooperation in science, technology, economy, politics, and eventually, as a potential means of last resort, the use of force. It is important to leave the violator the option of a face-saving exit at any of these stages. Ideally, enforcement measures should be preventive and involve minimal intervention. The accuracy and usefulness of the information by which enforcement action is triggered depends largely on the quality of verification measures.

All four steps would be required to assure adequate verification. In the past, the process was incomplete, and could therefore not be iterated, because either declarations were not given, monitoring was technically incomplete, inspections were politically unfeasible or enforcement was lacking power. Neither remote monitoring nor challenge inspections were possible under the IAEA safeguards system, explaining its limited effectiveness, as could be seen in the case of Iraq. Monitoring without inspection can raise suspicions but not prove them. Verification provisions must indicate who has authority to determine relevant sources of information, who should control the means to analyse this information and who determines the preventive action necessary. During the iterative verification cycle, the verification system can "learn" and improve the detection probability of treaty violation. Non-compliance is discouraged by limiting the usability of eventually remaining nuclear weapons capabilities and imposing unacceptable risks for the violator by determined action of the international community. In order to dissuade a potential cheater not to undertake his plan, a gradual and adapted reaction would be adequate on each stage of the "learning curve".

To assure that the obligations are realized within tolerable limits of deviation, a variety of verification means and procedures can be applied, as listed in the following table. Some technical possibilities are principally available, others require additional research and development.

Verification Means and Procedures

1. Monitoring technologies

- Remote sensors in the visible, infra-red or radar spectra, based on satellites, aircraft or on the ground
- Signal and electronic reconnaissance
- Seismological, radionuclide, hydroacoustic and infrasound monitoring
- On-site sensors for non-destructive measurement, e.g. for portal perimeter monitoring: measurement of weight, length, acoustics, light (UV, infrared, visible), electrical and magnetic fields; passive radiation measurement, active radiation (x-ray, gamma ray, beta particles, protons, neutrons)

2. Cooperative procedures for information exchange, inspections and safety controls

- Nuclear archaeology
- Initial declarations and data exchange
- Identification and item counting of objects (tagging, fingerprinting, registration,
- Confidence-building measures
- Joint overflights (Open Skies)
- Accountancy, control and surveillance
- Preventive controls at nuclear facilities
- Baseline and routine inspections
- Challenge inspections of suspected facilities (anytime-anywhere)
- Personal observation of destruction and suspected activities

3. Institutional verification

- International Agency for Verification
- Cooperative fact finding on compliance
- Consultation
- Dispute settlement

4. Societal verification

- Open sources, scientific knowledge
- Espionage
- Citizen reporting and protection, whistle-blowing

7 The role of citizens, scientists and the public

Citizens and non-governmental organizations can play an important role in promoting and implementing arms control and disarmament. In order to increase public awareness, a greater public discourse on the proliferation problem and its resolution is required. By building a network of information exchange and debate, experts, civil society and officials could be jointly engaged in this process. Although comprehensive proposals may currently seem utopian, they may become more, not less, important as a means of preserving stability and reducing uncertainty in a world of dangerous and costly arms races. If the arms race on earth and in space is not prevented, the situation could become more unstable, complex and run out of control. Even the United States may wish to take international measures to reduce uncertainty and prevent damage to its own security interests once ICBMs, ASATs, nuclear and laser weapons of other countries are fully developed. Whether a control system will work in a hostile environment is questionable.