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Towards a Nuclear-Weapon-Free World

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Nuclear weapons: technical and legal aspects

The introduction of nuclear weapons constituted a qualitative, drastic difference with respect to previous instruments of war. Suffice it to note that the largest nuclear weapon exploded experimentally released in a fraction of a second an amount of energy much larger than the cumulative energy yielded by all explosives used in war throughout the entire history of humankind.[1] Moreover the deadly effects of nuclear weapons include, in addition to those caused by the blast and by the heat flash (causing burns and fires), those due to nuclear radiation: the immediate ones due to the neutron flash from the explosion and the delayed ones due to the local radioactive fallout occurring in the minutes and hours after the explosion whenever its fireball touched the ground, and that occurring months and years later due to the nuclei from the bomb material thrown in the higher atmosphere. Some of these radioactive effects (causing cancers and genetic diseases) linger for exceedingly long times (centuries).[1] Due to their enormous scale, the effects of nuclear weapons are indiscriminate and excessive; for these reasons the International Court of Justice has declared the threat or use of nuclear weapons to be contrary to the rules of international law applicable in armed conflict.[2]

Nuclear weapons: strategic aspects

After their use at the end of the Second World War to destroy Hiroshima and Nagasaki (6 and 9 August 1945), nuclear weapons were never again used in any armed conflict; even when nuclear-weapon States were defeated in war by non-nuclear-weapon adversaries, as, for instance,

the USA in Vietnam and the Soviet Union in Afghanistan. On the other hand, in the context of the Cold War enormous arsenals of nuclear weapons of many kinds were manufactured – mainly by the United States and the Soviet Union – and kept on quick reaction alert postures envisaging their use within minutes.[3,4] And in some cases – such as the crisis in the fall of 1962 triggered by the attempt of the Soviet Union to station nuclear-armed missiles in Cuba – the world came quite close to a nuclear war. Even today, after the end of the Cold War and in spite of significant progress in nuclear disarmament, the available nuclear arsenals – mainly in the hands of the USA and Russia – are so large (well over *twenty thousand* nuclear weapons!)[3] that use of even a fraction of them in a global nuclear war would signify the end of our civilization, possibly the termination of the *homo sapiens* experiment on this planet. And part of these arsenals are still kept on quick alert configurations envisaging the possibility of their employment within minutes.[4]

In the context of the excessive destructive power of nuclear weaponry, the conceptual framework invented to justify their acquisition was the idea of "deterrence". The fundamental justification for acquiring a nuclear arsenal was to prevent a nuclear attack by a nuclear-armed adversary via the threat of a devastating retaliation: hence in the Cold War context a situation of "mutual assured destruction" came to be considered the main guarantor of peace. But each side also tried to prevent the nuclear damage potentially caused by the other side, by acquiring the capability to perform disarming nuclear strikes. This was instrumental to cause the nuclear arms race that led, in the Cold War context, to the acquisition and deployment of enormous nuclear arsenals.[3] Moreover, the notion was propagated that even minor differences in strategic arsenals had a significant relevance (military, political, psychological…).[5] And it was also suggested that a nuclear arsenal might be useful to deter adversaries also from other military demarches, like attacks with conventional forces or other nonconventional weapons (for instance chemical or biological weapons).

Recently it has been convincingly argued in favor of a return to the original doctrine, stating that the only reasonable, and possibly justified, usefulness of the possession of nuclear weaponry is to prevent the use of nuclear weapons by others; and that this notion of deterrence is quite robust, hence a limited nuclear arsenal is sufficient to back it (see for

instance[6]). This argument of course opens the way to progress towards a Nuclear-Weapon-Free World (NWFW), in which context the motivation to possess nuclear weapons will disappear.

The proliferation of nuclear weapons

At the end of the 1960s it seemed likely that tens of countries would acquire nuclear weapons: indeed, many states had initiated programs in that direction. The Non-Proliferation Treaty (NPT) was quite effective in stopping this trend.[7] Also important was the additional institution of several nuclear-weapon-free zones, which cover now more than half of our planet.[9]

But recently the international regime of nuclear-weapon non-proliferation began to crumble. It is indeed obvious that this regime is unstable: sooner or later (and it now appears rather sooner than later) it will either evolve towards a NWFW, or instead towards a world with very many nuclear-arming and nuclear-armed states, leading to a catastrophic end of our civilization and perhaps of *homo sapiens.*[10]

The elimination of nuclear weaponry: an idea whose time has come

The desirability and feasibility of achieving a NWFW is not a new notion.[11] But the recent endorsement of this idea by a bipartisan quartet of eminent American statesmen well-known for their hard-headed realism[12] has set in motion a worldwide cataract of analogous stands[13], culminated in the commitment to this goal unambiguously declared by the President of the United States in a remarkable speech delivered in Prague on April 5, 2009.[14] This stand had also been jointly endorsed a few days earlier by the Presidents of the United States and Russia.[15]

The immediate next steps

The immediate next steps towards the eventual achievement of a NWFW are clear, indeed several of them were listed by President Obama:[14] significant progress in nuclear disarmament, to begin with among the two nuclear superpowers, USA and Russia, and in this con-

text cancellation of the quick alert posture of nuclear weapons; ratification of the Comprehensive Test Ban Treaty by all countries, in particular by the USA and China and by the other countries whose signature and ratification is required for its entry into force (entailing the full verification activity of the Comprehensive Test Ban Treaty Organization); progress towards a Treaty banning any additional production of weapon-grade fissile materials; a reformulation of the USA Nuclear Posture Review (now in progress) consistent with the recognition that the only role of nuclear weapons is to deter the use of nuclear weapons, opening the way to an analogous revision of nuclear strategy by NATO and by all other states possessing nuclear weapons; a satisfactory outcome of the next Quinquennial NPT Review Conference (May 2010).

The achievement and viability of a nuclear-weapon-free world

As the end of the Cold War is fully internalized by the leadership and the citizens of the main relevant countries (in particular Russia, China and the USA), the main motivation for retaining nuclear arsenals – let alone keeping them in a quick alert posture – shall dissipate. It will then become more and more obvious – beyond the obfuscations of those who have a vested interest in the nuclear-weapon complexes and tend to cling to world views consistent with this mindset – that the alternative futures for humankind are either a stable NWFW backed by adequate verification, or viceversa the collapse of the nuclear-weapon non-proliferation worldwide regime – with dire implications. The choice among these two alternative paths is now.

As for the design and long-range viability of a NWFW – while it is still too early to undertake detailed examinations of all its fine-print aspects – blueprints do exist[16] as well as successful models, such as the current regime sanctioning the worldwide elimination of chemical weaponry.[17]

Our stand

Barack Obama seems committed to move towards a NWFW.[14] As President of the USA, he is eminently qualified for this task. But he, and

his Administration, face great resistances, both internationally and domestically: mainly caused by the significant shift of mindset needed in order to reach this goal. Hence, in spite of a remarkable array of positive endorsements worldwide, and also in the USA, the path towards the achievement of this goal is uphill, as indicated by the likely opposition – possibly also motivated by parochial political motives – to some of the developments identified above as immediate and important steps. In this context we wish to express our strong support for this endeavor and all these steps, based on our appreciation of the crucial importance for the very survival of humankind of this goal no less than on our assessment of its practicality.

Notes

[1] The largest experimental nuclear explosion was done (30 October 1961) in the high atmosphere (at an altitude of 4,000 meters over the northern island of Novaya Zemlya), by the Soviet Union then led by Nikita Krushev. Its energy yield was over 50 megatons. *1 megaton* is the energy yielded by the explosion of *one million tons*, namely *one billion kilograms*, of high explosive (TNT). The cumulative energy yield of all explosions in war throughout the history of humankind (including the carpet bombings of German and Japanese cities in the Second World War, Hiroshima and Nagasaki, the explosives used in the Vietnam and Afghanistan conflicts and all subsequent wars) is reliably estimated not to exceed *ten megatons*. Moreover, the yield of that thermonuclear bomb could have been made larger (by as much as a factor of two) by the standard procedure to envelope its core with a blanket of Uranium, whose nuclei would have then been fissioned by the neutron flash produced by the explosion. This would have entailed a much larger amount of radioactive fallout, in the months and years after that explosion. In spite of this restraint, many thousands of cancer casualties, throughout the globe, are estimated to be due to that test explosion in the following years and centuries (although tracing each of them to that cause is impossible). For this reason Andrei Sakharov, who had played a leading role in the development of thermonuclear explosives in the Soviet Union, was strongly opposed to this experiment. This initiated his criticism of the Soviet regime, leading eventually to his outspoken dissidence and his internal exile.

[2] An advisory opinion on the *Legality of the Threat or Use of Nuclear Weapons*, requested by the World Health Organization in 1993 and by the United Nations General Assembly in 1994, was handed down on 8 July 1996 by the International Court of Justice. It stated, *inter alia*, that "the threat or use of nuclear weapons would generally be contrary to the rules of international law applicable in armed conflict, and in particular the principles and rules of humanitarian law. However, in view of the current state of international law, and of the elements of fact at its disposal, the Court cannot conclude definitively whether the threat or use of nuclear weapons would be lawful or

unlawful in an extreme circumstance of self-defence, in which the very survival of a State would be at stake".

[3] For data on the existing nuclear arsenals see, for instance, the regular updates reported in the *Bulletin of the Atomic Scientists*, the most recent of which provides a global overview: Robert S. Norris and Hans M. Kristensen, "Nuclear Notebook: worldwide deployments of nuclear weapons, 2009", *Bulletin of the Atomic Scientists*, November/December 2009, pp. 86-98. DOI:10.2968/065006010 (http://thebulletin.org).

[4] See, for instance, "Reframing Nuclear De-Alert (Decreasing the operational readiness of U.S. and Russian arsenals)", Report of a meeting convened by the EastWest Institute, 2009 (www.ewi.info).

[5] A. Wohlstetter, "The delicate balance of terror" (http://www.rand.org/publications/classics/wohlstetter/P1472/P1472.html).

[6] Hans M. Kristensen, Robert S. Norris and Ivan Oelrich, "From Counterforce to Minimal Deterrence", Federation of American Scientists & Natural Resources Defense Council, Occasional Paper no. 7, April 2009 (available from www.fas.org and www.nrdc.org).

[7] The NPT was signed July 1st, 1968, and entered into force March 5th, 1970. It identifies two categories of States: 5 nuclear-weapon countries (those who had demonstrated a nuclear-weapon capability before 1967: USA, Soviet Union now Russia, United Kingdom, France, China) and all other countries. The nuclear-weapon countries commit themselves not to spread nuclear weaponry and to eventually make progress in nuclear disarmament. The non-nuclear-weapon countries commit themselves not to acquire nuclear weapons. Moreover the NPT reaffirms the right of all countries to acquire peaceful nuclear technologies; for non-nuclear-weapon countries the peaceful character of these activities must be verified by the International Agency for Atomic Energy. *All* countries of the world are now parties of the NPT, except *three* who never signed the NPT: India, Pakistan and Israel. The first two have recently demonstrated a nuclear-weapon capability by testing nuclear weapons; Israel has an official policy of opacity concerning its nuclear-weapon capabilities, but it is widely believed to possess an operational nuclear arsenal. North Korea also tested nuclear weapons; its status with respect to the NPT is now unclear. The NPT envisages every 5 years a Review Conference. In 1995, at the 5th Review Conference, it was agreed that the Treaty has no time limit. The next Review Conference will take place in May 2010. For a recent capsule assessment of the NPT by President Obama, see [8].

[8] "In the middle of the last century, nations agreed to be bound by a treaty whose bargain is clear: All will have access to peaceful nuclear power; those without nuclear weapons will forsake them; and those with nuclear weapons will work towards disarmament. I am committed to upholding this treaty. It is a centerpiece of my foreign policy. And I'm working with President Medvedev to reduce America and Russia's nuclear stockpiles". Oslo, December 10th, 2009, Nobel Peace Prize acceptance speech by Barack Obama (http://www.whitehouse.gov/the-press-office/remarks-president-acceptance-nobel-peace-prize).

[9] See the various URLs yielded by googling "nuclear-weapon-free zones".

[10] Since exoplanets with physical conditions conducive to the emergence of life are likely to exist in the Universe yet the search for signals from other intelligent beings

in the cosmos has been so far unsuccessful, some make the hypothesis that intelligent civilizations eventually destroy themselves because the laws of nature allow for the development of nuclear explosive devices.

[11] See, for instance, *A Nuclear-Weapon-Free World: Desirable? Feasible?*, edited by J. Rotblat, J. Steinberger and B. Udgaonkar, A Pugwash Monograph, Westview Press, 1993; *Report of the Canberra Commission on the Elimination of Nuclear Weapons*, August 1996 (http://www.dfat.gov.au/cc/CCREPORT.PDF).

[12] George P. Shultz, William J. Perry, Henry A. Kissinger and Sam Nunn, "A World Free of Nuclear Weapons", op-ed, *The Wall-Street Journal*, January 4, 2007 (http://online.wsj.com/public/articleprint/SB120036422673589947.html); "Toward a Nuclear-Free World", *ibidem*, January 15, 2008 (http://online.wsj.com/article/SB116787515251566636.html).

[13] A first positive reaction to the first op-ed by Shultz et al. was soon issued by Mikhail Gorbachev ("The nuclear threat", *Wall-Street Journal*, op-ed, January 31, 2007). Subsequently many other analogous stands were taken by, generally bipartisan, groups of eminent politicians and public figures in many countries, including the United Kingdom, Italy, France, The Netherlands, Norway, Japan, Canada (these texts as reported, for instance, on the Pugwash website: pugwash.org). Another significant indication of the worldwide change of mindset is the Resolution 1887 (2009), *unanimously* adopted by the United Nations Security Council, meeting on 24 September 2009 under the (rotating) chairmanship of the President of the United States. Its opening paragraph reads: "*Resolving* to seek a safer world for all and to create the conditions for a world without nuclear weapons, in accordance with the goals of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), in a way that promotes international stability, and based on the principle of undiminished security for all". The historical significance of this resolution was underlined by the presence of 14 Heads of State (http://www.un.org/News/Press/docs/2009/sc9746.doc.htm).

[14] http://www.whitehouse.gov/the_press_office/Remarks-By-President-Barack-Obama-In-Prague-As-Delivered/.

[15] "…We committed our two countries to achieving a nuclear free world, while recognizing that this long-range goal will require a new emphasis on arms control and conflict resolution measures, and their full implementation by all concerned nations…", April 1, 2009 (http://www.whitehouse.gov/the_press_office/Joint-Statement-by-President-Dmitriy-Medvedev-of-the-Russian-Federation-and-President-Barack-Obama-of-the-United-States-of-America).

[16] For a draft convention to abolish nuclear weapons see, for instance, http://lcnp.org/mnwc/. For an overview of these ideas see, for instance, the recent book by Bruce Larkin, *Designing Denuclearization. An Interpretive Encyclopedia* (Transaction Publishers, Piscataway, New Jersey, USA, 2008), and the associated website http://www.gcdd.net.

[17] The worldwide ban of chemical weaponry, including the total elimination of existing arsenals, is now a rather successful reality, see for instance the website of the Organization for the Prohibition of Chemical Weapons (www.opcw.org). The verification of the observance of the Chemical Weapon Convention sanctioning the abolition of chemical weaponry – entailing some kind of supervision of the world chemical indus-

try – is a more difficult endeavor than the analogous task regarding peaceful nuclear activities shall be. The argument that violations of a NWFW regime would be more dangerous than violations of the current Chemical-Weapon-Free World regime, while undoubtedly valid, cannot be overblown to exclude the viability of a NWFW, especially if the real strategic role of nuclear weaponry is correctly assessed on the basis of their *de facto* rather minor historical relevance [6].