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The Resurrection of Multilateral Disarmament

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Introduction

My warm thanks to the Pugwash Conferences on Science and World Affairs for the great honour of being invited to deliver the Dorothy Hodgkin Memorial Lecture. I am not a scientist and must admit to being among those who have suffered from the schism of the 'two cultures' of the sciences and the humanities which C.P.Snow famously spoke of in his historic 1959 Rede Lecture. It is a schism which has still to be bridged in modern education even though the complexity of contemporary life demands a more holistic and integrated approach to all issues that face us today and which the ubiquity of ICT alone cannot achieve.

I have, however, been a longtime admirer of the firm principles and dedicated endeavours of the Pugwash Movement which has deservedly earned you all the Nobel Peace Prize in 1995.The Russell-Einstein Manifesto of 1955 - the 50th anniversary of which will be observed in 2005 - remains an awesomely prescient and inspiring document for the peace and disarmament movement. As a testament of nuclear disarmament and the abolition of war it will remain historic. But it is also a virtual Hippocratic Oath for scientists confronted with the eternal dilemma of dual use ingenuity. It is a statement of conscience and of accountability of all scientists as human beings. As Bertrand Russell wrote in his letter of 5th April, 1955 to Albert Einstein, "Scientists have, and feel they have, a special responsibility, since their work has unintentionally caused our present dangers." It is not only to scientists that the Russell-Einstein Manifesto appeals but to scientists as human beings faced with the extinction of their species if nuclear weapons are ever used again. This is where these two wise men were echoing the words of Immanuel Kant who once wrote "Science is organized knowledge. Wisdom is organized life". We have, 48 years after the Russell-Einstein Manifesto was issued,

still to make the transition from knowledge to wisdom and to respond to its appeal that "We have to learn to think in a new way" on questions of weapons of mass destruction(WMD).

This lecture is in memory of Dr. Dorothy Crowfoot Hodgkin - chemist, pioneer crystallographer, Nobel Laureate and of course - as President of Pugwash - supporter of the humanist and humanitarian cause of nuclear disarmament. I hope my modest contribution will be seen as an act of homage to her memory.

The Problems

I have chosen to speak on "The Resurrection of Multilateral Disarmament" before a group of very distinguished scientists not because I am a naïve optimist or because I seek some genetic engineering breakthrough to invent a new clone to bring about transformational change in the disarmament field. The multilateral system for disarmament and arms limitation is widely regarded today as moribund. The responsible approach for those of us who remain committed to disarmament through the rule of international law is not merely to engage in hand wringing. We must do something to breathe new life into the system. Disarmament, especially the disarmament of WMD, is at a critical crossroad. It is true that we tend to identify periods of time as being critical when we disagree with contemporary trends. The Russell-Einstein Manifesto refers to times of peril during the Cold War. It is over a decade since the end of the Cold War led to an illusion of security as the prospect of global nuclear war receded into the background. The disarmament endeavour did lead to positive results in the past. Concrete reductions of nuclear weapons through actual destruction of missiles followed the INF and START I. Reductions (but not destruction) of deployed strategic weapons followed more recently after the Moscow treaty of May 2002 although most of us do not consider this a disarmament treaty. As a result we do have fewer nuclear weapons deployed today than at the height of the Cold War. The Comprehensive Nuclear Test Ban Treaty (CTBT) was signed in 1996 in a dramatic breakthrough for the advocates of nuclear disarmament who had long seen this as a litmus test of the political will to disarm. These apparent successes are now not only under siege but they stand a real danger of being overturned as nuclear weapons are, quite unabashedly, being given a new rationale and the dangers of both indefinite possession and proliferation have acquired a new urgency. Not only has the threshold for the actual use of nuclear weapons been lowered dangerously but allegations of WMD possession are being trivialized as casus belli without verifiable proof. The ideological basis for this existed in some countries before the events of 11 September 2001 but today counter-terrorism has been widely cited as the reason for massive increases in military expenditure.

Before we can revive the disarmament process let us analyze what afflicts it. The problems confronting the world in so far as WMD are concerned are complex. I would like to place them in five categories. The first is the horizontal proliferation of nuclear weapons beyond the five nuclear weapon states recognized in the Nuclear Non-proliferation Treaty (NPT). With the South Asian nuclear tests of 1998 we have, de facto, 8 countries with a nuclear weapon capability (not counting the Democratic People's Republic of Korea). A dilemma, both political and moral, lies at the root of the non-recognition of Israel, India and Pakistan as nuclear weapon states. And yet without their active co-operation we are unable to make progress on nuclear disarmament let alone nuclear abolition. In every one of the cases of proliferation since the NPT was signed in 1968, a recognized nuclear weapon state has either wittingly (for raisons d'etat) or unwittingly (through careless custody of nuclear material and /or technology or naïve transfer of technology arrangements) been the source of the transfer of this technology. The burden of guilt, whatever the circumstances, is clear. What are worse are the dual standards being adopted towards proliferation with some proliferation being regarded as benign and others as being downrightly evil depending on the nature of the ruling regime in the proliferating country. This Manichean judgment is made in terms of the relationship of the proliferating countries towards particular powers unmindful of the fact that regimes change and with them the relationships forged with the powers. The proliferation of nuclear weapons to Israel, India and Pakistan though not formally recognized is certainly being accepted as inevitable and irreversible. Realpolitik has played its role in this notwithstanding Security Council Resolution 1172 in respect of India and Pakistan. Countries who have had the capability of going nuclear and have not done so have witnessed this 'managed proliferation' with concern. Some may even be encouraged to harbour secret ambitions to go nuclear. The publicly declared stance of the Democratic People's Republic of Korea (DPRK) to withdraw from the NPT and announce its nuclear ambitions has raised the fear of proliferation in North-east Asia beyond DPRK in a sort of domino effect. We cannot forge a principled multilateral response to violations of non-proliferation norms if some members of the international community choose to look the other way. All this is symptomatic of a weakening of the non-proliferation norm and some cynicism regarding the subjective manner with which it has been implemented.

The second category of problems is connected to the first because of the failure of existing nuclear weapon states to fulfill their promises to disarm and to achieve the total elimination of nuclear weapons. As long as nuclear weapon states continue to enjoy the power, deterrence effects and influence derived directly from nuclear weapon possession we cannot realistically expect the non-proliferation norm to hold indefinitely. This is not to cite the record of nuclear weapon states as extenuating circumstances for nuclear proliferation. No WMD proliferation is acceptable. Our moral and indeed our scientific position would, however, not be complete if we did not at the same time deplore the continued possession of nuclear weapons by those who have them. The brazen withdrawal of DPRK from

the NPT and its open admission of a nuclear weapon programme have left the international community perplexed as to what credible and effective action can be taken. The IAEA has asked Iran to sign the Additional Protocol on safeguards as a demonstration of good faith on Iran's part and as a means of enabling the IAEA to expand its verification powers. We may well have more countries following the proliferation route either overtly or covertly especially since it is a moot point whether the invasion of Iraq has encouraged or deterred more countries to acquire WMD. The 'nth country' syndrome that was widely discussed in apocalyptical terms in the 1950s and 1960s has returned to haunt us.

The NPT was expected to be the bulwark to halt the trend towards proliferation and it has served that purpose admirably for three decades with the exception of Iraq and DPRK. Do we need fresh mechanisms now or do we need to end forever the casteism or apartheid between the 'haves' and the 'have-nots'? Those who have nuclear weapons regard it as their ' manifest destiny' while those who do not, appear to be under a 'cargo cult' - if I may borrow a term from the cultural anthropologists who write of the mesmerizing effect of manufactured goods being brought into developing countries by plane. Assuming that some supernatural force had endowed these developed industrialized countries with manufactured goods, the traditional societies of Melanesia in the 19th century prayed to the spirits of the dead to bring them cargoes of modern goods for distribution and restore their golden age to them. Sadly today the possession of WMD is seen as an attribute of power and development which can ensure independence and sovereignty. It is a quest to be 'mimic men' which V.S. Naipaul writes of in one of his early novels or the 'Brown Sahib' syndrome familiar to South Asians like me. The attractions of nuclear weapons in particular acquire greater urgency for medium to large size countries in conflict-ridden regional situations that have a reasonably strong industrial base to sustain a nuclear weapon development programme. That it conflicts with solemn treaty undertakings and international conventions is seen as less important than the overriding national security interest. After all the same argument of the supremacy of national interest is used by nuclear weapon states to abrogate treaties, to refuse to sign other internationally agreed conventions to protect global welfare and to actually attempt the legal invention of 'unsigning' treaties with impunity.

The third set of problems arises from the serious emergence of the danger that WMD may be used by terrorists or sub-national groups for anarchist, secessionist or other purposes. This danger predated September 11, 2001. It was among the reasons why the breakup of the Soviet Union was viewed with such alarm by those who cared about the safeguarding of nuclear materials and technology in the former Soviet states and the future of the trained nuclear scientists there. It was the first time in history that a nuclear weapon state had imploded and we have not learned any lessons that would make the next break-up of a nuclear weapon state any easier to manage. The visionary Nunn-Lugar Co-operative Threat Reduction programme has contributed greatly towards mitigating the problem but despite this

too many reports of leakages of material continue to be recorded. It proves not only that the safeguards are still inadequate but also that a demand continues for such materials with many shadowy groups in the market. After September 11, 2001 when the astonishing scale of the terrorist attacks in the USA were revealed, the relief that WMD were not used was quickly replaced by a deeper anxiety that such use was not beyond the reach of the organizational capacity of Al Quaeda and similarly well-funded and fanatical groups with their global reach. That anxiety is well founded not only in respect of nuclear weapons and the more likely danger of a 'dirty bomb'(or a radiological device to disperse radioactive material through the use of conventional explosives) but also with biological and chemical weapons where the detection of clandestine programmes is more difficult.

A different category of problems exists in the paralysis of the disarmament machinery and the weakening of the multilateral system which provided the context for constructive and result-oriented multilateral disarmament diplomacy. Twenty-five years after the First Special Session of the UN General Assembly devoted to Disarmament (SSOD I) achieved its remarkable Final Document by consensus we find the machinery it set up for the deliberation and negotiation of disarmament issues in disarray. The 66 member Geneva based Conference on Disarmament (CD) - a direct descendant of the Eighteen Nation Disarmament Commission (ENDC) - has not even been able to agree on a programme of work because of disagreements on the priorities of the disarmament agenda. Some states believe that the CD should resume work on negotiating a Fissile Material Treaty (FMT) for which a mandate - the Shannon Mandate - was agreed upon sometime ago. Others argue that concurrently with negotiations for a FMT work should also begin on the prevention of an arms race in outer space, on nuclear disarmament and on negative security assurances on the basis of mandates that could be non-negotiating if necessary. An earlier compromise formula by the then Brazilian Ambassador Amorim has now been elaborated as a proposal from five past Presidents of the CD cutting across group loyalties. This has failed to find acceptance and clearly the main actors in the stalemate are the USA and China. A lack-lustre debate is held perfunctorily when the CD meets but increasingly member states are losing faith in the process and some have withdrawn the Ambassadors they had specially accredited to this important body. Misguided calls for the abolition of the CD are dangerous. It is easier to destroy multilateral institutions than to create them. The CD has been idle for long periods before especially during the Cold War and I have no doubt that when political will reappears the CD will resume functioning.

In the cluster of deliberative bodies the First Committee of the General Assembly is the forum for disarmament and security issues. It meets annually during the autumn for approximately 5 weeks to go through an agenda of items. Some of them are 'hardy perennials' which are debated ritualistically and voted upon. Consensus is reached on a few resolutions but the resolutions on nuclear issues are invariably adopted with a division. Voting patterns have changed over the years

with most of the former Warsaw Pact countries now voting with NATO while the countries of the Non-aligned Movement (NAM) are no longer as tightly-knit as during the Cold War. The Security Council's discussion and action on disarmament issues has been confined to proliferation of WMD as in the Summit held in January 1992. It has also addressed country-specific situations as with Iraq. Another special meeting of the Security Council to discuss WMD proliferation issues is projected for later this year with a view to creating a mechanism analogous to the Counter Terrorism Committee (CTC) set up in the immediate aftermath of 9/11. This, I fear, will only reignite the concerns of the non-nuclear weapon states that the casteism of the 'haves' and 'have-nots' is being institutionalized at a time when a more inclusive approach is needed. The more specialized disarmament forum - the Disarmament Commission - failed to meet in its 50th year in 2002 and this year concluded its session without consensus on the two issues it had on its agenda for four years. In addition the Working Group set up by a resolution of the General Assembly to agree on an agenda for a fourth special session of the General Assembly on disarmament (SSOD IV) failed to reach consensus.

All these diplomatic failures are of course indicative of a general malaise in the political arena and cannot be blamed on the machinery itself or its individual components. Political will is frequently cited in diplomatic negotiations - the presence or absence of which can make a vast difference. Clearly the political will of key countries is more important than others. The generation of political will depends largely on public opinion in democracies, on pressures brought to bear on countries and on the policies pursued by incumbent governments. Ultimately it is the world view of a small group of very powerful countries that determines whether multilateral disarmament will work or not. It could decide to let some aspects of multilateral disarmament work in a sort of 'a la carte' multilateralist approach. This indeed appears to be present situation where on Small Arms and Light Weapons (SALW) we have a Programme of Action being implemented globally. On antipersonnel landmines, the Mine Ban Convention and the Additional Protocol of the CCW Convention are working on parallel tracks. A change of policy of a superpower like the USA can accelerate progress dramatically as happened when the Clinton Administration decided, against pressures from some vested interests, to begin negotiations on a CTBT bringing many of its allies to the table reluctantly. Today with the rejection of the ratification of the CTBT by the US Senate and the current Administration's policy the prospects for the entry into force of the CTBT are bleak.

Finally there is the category of problems arising from prevailing strategic or defence doctrines. It is the pursuit of these doctrines that influence decision-making in key countries and until these doctrines are abandoned or revised the current crisis in multilateral disarmament is unlikely to end. In the time of the Cold War the doctrine of Mutual Assured Destruction (MAD) was well known. The conventional arms superiority of the former USSR resulted in that country's adoption of the nuclear policy of 'no first use'. This was abandoned after the Cold

War when NATO was perceived to have a conventional arms superiority. Russian diplomats have told me that they were instructed to mine the statements of US representatives during the Cold War to find arguments in favour of this volte face!! Today only China and India have 'no first use' policies. It had also been expected that with the end of the Cold War there would be a lower salience of nuclear weapons in strategic doctrines and military strategies. However NATO - the only surviving military alliance and with additional members - remains wedded to the use of nuclear weapons, admittedly as a weapon of last resort. The efforts of Germany and Canada to have this reviewed have failed so far and small wonder that Russia therefore shows more reliance on nuclear weapons today.

The US, as the largest nuclear weapon state, has recently issued its Nuclear Posture Review and National Security Strategy. Both documents represent a fundamental change in post Cold war trends. Firstly the threshold for the actual use of weapons is being lowered dangerously as pre-emptive uses are planned even against non-nuclear weapon states. The contradiction of this with the Advisory Opinion of the International Court of Justice in 1996 and the Security Council Resolution 984 of 1995 providing security assurances for non-nuclear weapon states is obvious. Secondly the new policy - subsequently ratified by Congressional budgetary approval - is to begin research and development on 'mini-nukes' or low-yield nuclear weapons for specific purposes such as 'bunker busters' to penetrate hardened and deeply buried targets. The period of notice required for a resumption of nuclear testing has also been shortened although the Bush Administration has repeatedly stated that there is no intention to resume testing 'for the moment'. The other nuclear weapon states are also reportedly modernizing their nuclear weapons and continue research and development with a view to developing new generations of weapons. The new salience being given to nuclear weapons takes place in a context of resurgent militarism as global military expenditure reaches the heights of the Cold War years with the USA clearly in the lead. The unilateral abrogation of the ABM Treaty in order to clear the way for the development and eventual deployment of ballistic missile defence systems will also involve huge investments for a programme that is of doubtful value especially with the asymmetric warfare strategy of terrorist groups and the acknowledged vulnerability of the system. The distinction between offensive and defensive military doctrines is becoming blurred. Doctrines which involve the pre-emptive use of a weapon of mass destruction institutionalize violence. The distinction between the civilized world basing its actions on law and reason and the world of the terrorist using indiscriminate violence on the basis that the end justifies the means must be maintained at all times.

Possible Solutions

I have laid out a litany of troubles. Now what do we do about it? The enormity of the challenges I have discussed in their five categories cannot be overcome with

any one magic solution. Nor can a half hour lecture hope to suggest all the solutions to resurrect multilateral disarmament the death of which has been triumphantly proclaimed by the neo-conservatives of Washington D.C. think-tanks. I do believe however that the time has come for us all to 'think in a new way' as the Russell-Einstein Manifesto has urged us. Innovative ideas do not all come spontaneously. They require a collective endeavour. We have had the experience of high level commissions produce new ways of thinking and new concepts in the post World War II era. Institutions like the UN have also produced new ideas like 'human development' and 'good governance' and the ongoing project on the intellectual history of the UN will no doubt record this. But institutions have their own bureaucratic processes and their budgetary problems. We need a flexible and supple mechanism to seed a global change that will encompass all the global and regional organizations including the UN. Just as the Brandt Commission sensitized us all to the North/South divide; the Brundtland Commission gave us the concept of 'sustainable development' and the more recent International Commission on Intervention and State Sovereignty - sponsored by our host country Canada - yielded the concept of 'the responsibility to protect' we could also establish a commission to analyze the problems of multilateral disarmament and prescribe solutions. I have therefore proposed since April 2002, an International Commission on Weapons of Mass Destruction to be launched with senior political figures of influence and outstanding experts to examine the current state of affairs and recommend measures to break out of this situation. I am delighted that the Government of Sweden has on 3 July this year announced the establishment of such a Commission to be chaired by Dr. Hans Blix whose luminous integrity, unquestioned expertise and rich experience equip him well for the task ahead. We await further details about the Commission to be made available in the autumn. Some argue that the disarmament norms created after World War II are no longer valid in a changed global situation although they propose nothing to replace these norms. A global order is essential especially in the context of globalization. We cannot regress to anarchy or a situation where the most powerful dictate the rules. If we need to refashion or adapt norms or create fresh norms we must do so as a global community seeking the co-operation of all.

The Commission that I have advocated must have a broader mandate than nuclear weapons which was the Canberra Commission's mandate. Today chemical and biological weapons, despite being the subject of Conventions totally banning their production and use, have different levels of verification. The new threat of terrorism has enhanced the danger of the actual use of these weapons while the lack of universality in the two legal regimes governing these weapons is also worrisome. Civil defence programmes are increasingly preoccupied with the likely use of these weapons. The lethality of nuclear weapons in comparison to chemical and biological weapons is well established. However, for the purposes of a Commission we do not need to establish a hierarchy of weapons as long as we treat all WMD in one category because of their common threat to humankind, their indiscriminate nature and our need to ensure the survival of the human race. The

collapse of the seven year process to develop a Protocol to strengthen the 1972 Biological Weapons Convention (BWC) leaves the BWC without any effective verification mechanisms. In addition the mandate of the proposed Commission must include both the disarmament dimension and the proliferation aspect. To focus on one to the exclusion of the other would cause a major problem for the credibility of the Commission. The majority of the international community belongs to the NPT, the BWC and the CWC and would need to be convinced of the political objectivity of the Commission. The dangers of terrorist uses of WMD must also feature prominently in the mandate of the Commission. A carefully composed Commission with due regard to political and geographical diversity and gender balance supported if possible by a panel of experts, could over a period of time develop a set of innovative and far-reaching recommendations that could get us all out of the present rut. I am personally aware that UN Secretary-General Kofi Annan supports the proposal in principle and would be ready to have the Commission present its report to him in the same way that the International Commission on Intervention and State Sovereignty did. This could have influential policy implications.

Apart from the establishment of an International Commission the international community has a tool kit available to it for immediate action. For example, the Board of Governors of the IAEA can begin, as it has done with Iran, to demand that all states that plan to have nuclear power projects for peaceful purposes must sign the Additional Protocol to widen the agency's verification potential in their countries. The Article IV provision in the NPT for the peaceful uses of nuclear energy cannot be read as an absolute entitlement. It is an incentive and should have been more generously implemented by developed countries to fund non-power projects in areas like medicine and agriculture. For nuclear power projects, given the thin line separating peaceful and non-peaceful uses of nuclear energy and the fact that existing arrangements to safeguard declared facilities have proved inadequate, it is reasonable for additional measures to be taken as a confidence building measure internationally. Equally more money can be pledged for non-power uses in the same way as the G8 pledged $ 20 billion for Co-operative Threat Reduction measures last year. Thus the signature of the Additional Protocol, hitherto a voluntary measure, will be deemed to be a pre-requisite for the supply of nuclear projects, fuel and other assistance.

There are other measures open to the international community in the nuclear area. Strategic nuclear weapons remain an important area for action by the nuclear weapon states. Equally important, if not more so, is the question of sub-strategic or tactical nuclear weapons which must be addressed urgently. While the entry into force of the CTBT remains dependent on the political will of the USA we can legitimately expect India and Pakistan, who promised to do so in 1998, to sign the CTBT as a first step and as evidence of responsible behaviour. On a FMT while the CD remains deadlocked it is important that informal discussions commence among the 8 nuclear weapon capable countries so that when negotiations in the CD

do begin they will have a basis to build on. Another measure that is now being recognized is the need for more funding for the IAEA and the OPCW to conduct their verification responsibilities as well as to take special measures against terrorist uses of WMD. The strengthening of the Convention for the Physical Protection of Nuclear Material, greater circumspection in the transport of nuclear material and the multilateralisation of the Co-operative Threat Reduction programme are among other measures that can be taken without delay.

In the chemical weapons area, the OPCW under its energetic new leadership and with strong US support now must prove that its unique verification powers under the CWC can in fact be implemented. This would instill confidence in verification procedures and in disarmament treaties amidst the propaganda about the virtues of 'paperless disarmament' and the dangers of placing too much faith in treaties. Countries like the Russian Federation with genuine financial difficulties in fulfilling their treaty obligation to destroy chemical weapons will need to be assisted. In the biological weapons area the agreement reached at the resumed BWC Review Conference in 2002 augurs well for the prospects of national legislation implementing the BWC and for the eventual criminalization of the violation of the BWC under domestic laws. Several other areas will be explored in the three annual meetings that will take place before the next Review Conference and this is a healthy sign of a multilateral process at work.

The salvaging of the BWC Review Conference is itself an illustration of how multilateral disarmament diplomacy can be kept alive. It is no secret that creative diplomacy by the European Union helped to forge a compromise which the US tacitly accepted and the NAM acquiesced in out of a realization that it was the best result that could be obtained in the circumstances. We need more of these bridge-building exercises across political groups if multilateralism in disarmament is to remain robust and productive. Group solidarity is understandable but in circumstances where total failure is so self-evidently destructive of the multilateral process, individual diplomats with stature and credibility as well as individual countries with broad acceptance must activate themselves in the search for compromises. The approach that suggests that nothing can be accomplished until political circumstances are more propitious is essentially myopic and ultimately harmful to the cause of disarmament.

A long-term strategy that was identified in the UN Secretary-General's Advisory Board for Disarmament Matters was the need for disarmament and non-proliferation education to ensure an informed public opinion especially in the current context of indifference. This led to a General Assembly mandated expert study of the subject and a report with a number of many useful recommendations endorsed by the General Assembly in 2002. These recommendations are in the process of being implemented by the United Nations but they require the combined commitment and resources of the entire global community for the results to be seen.

The Role of the Scientist

It is in this context that the role of the scientist in terms of the Russell-Einstein Manifesto assumes great importance. The urgent need for a code of ethics to govern scientists working in the defence sectors in all countries cannot be overemphasized. The inherent ambiguities in dual use technology are of course difficult and complex. Despite this or precisely because of this, a code of ethics and a system of mentoring younger scientists can help to ensure moral clarity where legal precision may be difficult to achieve. Research and Development programmes in the weapon industry have to depend on scientists. As long as the right to self defence remains guaranteed by Article 51 of the UN Charter and the provisions for the collective defence of international peace and security can be exercised by the Security Council under Chapter VII of the Charter we will have armies and we will have weapons which nations will seek to modernize. A weapon-free world is therefore a Utopian ideal which the scientist cannot expect any more than others. However all of us can legitimately expect a lower reliance on weapon based security given its obvious limitations in comparison to the more durable human security that sustainable human development can achieve through non-military means. We can demand that lower levels of arms be achieved to assure security. Thus the pressure from military-industrial complexes throughout the world for more resources for weapons development must be resisted by scientists. The latest Yearbook released by the prestigious Stockholm International Peace Research Institute (SIPRI) reveals that global military expenditure is running at $ 128 per capita after the acceleration we witnessed globally in 2002 ostensibly because of 9/11. While the USA accounts for 43% of global military expenditure collectively USA, Japan, UK, France and China total 62% of what the world spends on arms. The statistics quoted for 2001 reveals interesting regional variations in military spending with the Middle East (6.3%), North America (3%) and Central and Eastern Europe (2.7%) above the global average of 2.3% while Latin America (1.3%), Africa (2.1%), Asia (1.6%) and Western Europe (1.9%) . While political tensions undoubtedly contribute towards these figures scientists engaged in R&D can play a decisive role in rejecting military solutions to political disputes. We shall never achieve the Millennium Development Goals of the United Nations at current levels of military expenditure.

Existing treaties like the NPT, CWC and BWC together with political commitments solemnly made in the final documents of conferences make it abundantly clear that all states are obliged to achieve the total elimination of WMD. We are thus faced with the threat of burgeoning conventional weapons and the possible development of new types of weapons including those based on new physical principles. Here the need for a code of ethics becomes vital for application across national boundaries. It will prohibit scientists from engaging in any activities that contravene existing treaties and conventions in the arms limitation and disarmament field. Where new weapons or refinements of existing weapon

technologies are contemplated the principles of humanitarian law and the protection of civilians must be the guideline. National scientific bodies such as Academies of Sciences and international scientific organizations must take responsibility for harmonizing codes of ethics and for their implementation. If a plaint is filed against a scientist for violating the code of ethics an inquiry must be instituted and if the verdict is guilty the withdrawal of professional membership and recognition must follow. It is only by maintaining the highest standards that we can ensure that scientists do not allow their skills to be subverted or exploited. Where scientists, especially those in dictatorships, have been coerced, whistle-blowing should be encouraged within the code of ethics as part of our common responsibility to protect humanity. With the functioning of the International Criminal Court it would follow automatically that any scientist found guilty would automatically be struck off professional rolls and be disqualified from pursuing his or her scientific career.

Verification technology is an area where a great deal of good work has already been accomplished. The state of the art technology installed in Vienna and other parts of the world by the Provisional Technical Secretariat of the CTBT and IAEA's technical equipment and expertise in implementing safeguards agreements are some outstanding examples. More needs to be done in order to remain several steps ahead of violators of treaties and to detect clandestine programmes. Satellite imagery has been developed to a remarkable level of accuracy. Although national intelligence agencies do not divulge their high resolution imagery even to the UN, commercially available imagery has enabled NGOs like the Federation of American Scientists and others to monitor disarmament related developments and inform the general public of their findings. Greater availability to the public of high resolution satellite imagery and improvements in the quality and the reading of this imagery will make the detection of clandestine programmes by both states and terrorist group more likely. It will also make for a better informed public at a time when civil liberties are being curtailed and transparency sacrificed in the campaign against terrorism. The benefits also include greater confidence in the verifiability of disarmament agreements and greater confidence that cheats do not get away with their bad faith actions. Other verification devices and aids could be invented and popularized as a confidence-building infrastructure to the web of treaties and conventions that restrain the unbridled pursuit of weapon development. Radar and early warning systems are also technological areas by which conflicts can be prevented. Their potential has to be exploited through the collective work of scientists. A Canadian proposal for a peacekeeping satellite - PAXSAT - remains unimplemented for lack of funds while billions of dollars are spent on new weapons. Scientists can be at the forefront of public campaigns demanding more resources for peaceful research to ensure a safer and better world.

Finally there is the task of education in the disarmament and proliferation area to which I have referred earlier. The dangers of the arms buildup and of proliferation

can best be explained to younger generations by the scientific community in terms that are clear and irrefutable. It is an investment in our future. It is a responsibility they have to their fellow human beings. In the words of the Russell-Einstein Manifesto "Remember your humanity".

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