

Strengthening and Implementing the International Nuclear and Radiological Security Framework – The aspect of control over “intangible technology”

For this distinguished and very knowledgeable audience, it would be both disrespectful and otiose to summarise all that has been written and debated on the subject of nuclear and radiological security. I will take the following treatises and documents as at least familiar, if not read:

1. Perkovich and Acton. Eds. *Abolishing Nuclear Weapons*, Adelphi Paper 396 (2008) and its critiques-added follow-up by CEIP in 2009.
2. The papers read, and presentations made, at the CEIP Conference on Nonproliferation, April, 2009
3. Conventions and Protocols on the physical protection of nuclear materials and their transport. Critiques, commentaries and stated national positions thereon.
4. The Igor Khirpunov (*CITS, Georgia, US*) thesis on the trade-off between security and safety at nuclear installations.
5. The material appearing on the website of the UNSC 1540 Committee (www.un.org/sc/1540). In particular, S/2010/52 of 1 February 2010 being a [sic] final document on the 2009 comprehensive review of the status of implementation of United Nations Security Council resolution 1540.

This is not really the forum or occasion to engage in a tedious recitation of the conclusions and recommendations of these and other such studies and documents, or the obligations imposed on States which have voluntarily acceded to international conventions and protocols concerning the safety and security of nuclear materials.

I will also take as consensus that even if the minimum quantity of HEU or Pu (particularly) were to become available to a non-state actor, configuring it into a device which produces a nuclear explosive yield is a non-trivial task. But not so for Radiological Dispersal Devices (RDDs).

What I intend to do, however, is to point to one aspect of the national implementation of nuclear and radiological security; why it will be necessary to specifically address this aspect, and why prestigious scientific associations such as the Indian National Science Academy; the UK Royal Society, and legislatively mandated

scientific academies such as the US National Academy of Sciences may need to revisit their roles and responsibilities – and to revisit even their vigilant and vigorous defence of the cherished freedom of self-regulation of scientific conduct.

1. National controls over flows of technology – what the 1540 Committee found

In respect of controls over “technology” States have adapted their earlier systems of controls over tangible goods to implement policies and practices of effective administration and enforcement of controls of the flows of technology. The 1540 Committee follows primarily three indicators of how States have made such adaptations: The inclusion of technologies as well as goods in lists of controlled items; the coverage of intangible transfers of technology in their control systems; and controls on the flow of information to foreign nationals within a State’s boundaries (i.e. deemed exports). In its 2008 the Committee reported -- from the information supplied by all 192 States -- that only 62 States reported the inclusion of technologies in lists of controlled items; 46 States reported that they had measures within their control systems to cover transfers of technology; and only 18 had measures to control the flow of information to foreign nationals resident within their borders. Far fewer States had measures in place to penalize violations of those measures. (1)

2. Why it is necessary to address flows of “technologies”

The instrumentality of choice of terrorists is the WMP – Weapon of Mass Panic. This is a one-off device or assembly that is custom-fabricated or packaged so as to be one-occasion used in a form that is ‘fit for purpose’ – the terrorist’s purpose being to create mass panic, fear and societal disruption or paralysis. The witnessed near-simultaneous murder or permanent radiation sickening/maiming of relatively fewer numbers of people is only the macabre instrumentality to achieve that dramatic purpose.(2)

Examples abound. A famous one in the United States, involving a significant level of scientific acumen, being the USAMRIID/Anthrax case.

1. See: Paragraph 63 of Report of the Committee Established pursuant to Security Council Resolution 1540(2004), United Nations Security Council document S/2008/493, 30 July 2008. Available at: www.un.org/sc/1540/committeereports.html

2. I am not sure there is a consensus on this definition of a terror weapon. I have developed it only to make the points further on.

The common element in these cases, and more horrendous ones that can be imagined, is the ability of the perpetrators to generate or access the "technology" necessary to bring such a WMP into being and then into use. A bench scientist, working to wages in a laboratory has accessed or enabled access to materials, equipment or methods of construction for the one-off fabrication of a WMP. As the AQ Khan case has demonstrated, once the knowledge is out, it is extremely difficult -- if not impossible -- to control its replication and misdirected re-use. If such activity is to be stymied or disrupted, it will be necessary to address the issue of the generation, access to, and flow of, dual-usable knowledge or "intangible" technology.(3)

3. Codes of Conduct and their enforcement – licensing scientists

A lot has been written, and many seminars and gatherings have deliberated on the subject of Codes of Conduct for scientists. Hippocratic oaths have been proposed, some even taken. But so far as I am aware, no sanctions of any significant kind are visited upon those who violate those codes – save the loss of professional reputation amongst a relatively small peer group.

In contrast, almost every other significant professional group I can think of – doctors, lawyers, chartered accountants, architects, civil engineers – enforces its Code(s) of Conduct through a system of licensing the eligible to practice that profession. For various grades of negligence or other infractions of the code of conduct, these professionals are sanctioned – the ultimate sanction being the permanent loss of licence which debars the individual from ever engaging again in the practice of his or her profession.

3. For the purpose of effecting control over transfers of technology, India's "The Weapons of Mass Destruction and Their Delivery Systems (Prohibition of Unlawful Activities) Act, 2005", specifically enacted to fulfill India's obligations under UNSCR 1540, defines "technology" in terms of the content of information, rather than – as many other Acts do – the media through which that information is transferred or transmitted. That definition reads:

"technology" means any information (including information embodied in software) other than information in the public domain, that is capable of being used in –

- (i) the development, production or use of any goods or software;
- (ii) the development of, or the carrying out of, an industrial or commercial activity or the provision of a service of any kind.

Explanation. – When technology is described wholly or partly by reference to the uses to which it (or the goods to which it relates) may be put, it shall include services which are provided or used, or which are capable of being used, in the development, production or use of such technology or goods.

In the different, but not altogether unrelated, context of promoting and enforcing counter-fraud in science, I proposed in a letter to *Nature* (4) that scientists be licensed to practice by professional bodies, such as the Indian National Science Academy or The Royal Society. No scientist without such a licence – of various grades, including an ‘apprentice licence’ perhaps, can offer his professional services under any contract, or be hired either by government or the private sector.

Without getting into the details, it is possible to design such a licensing system for scientists and engineers, with appropriate psychological tests being applied before a licence is issued for those who wish to seek employment in nuclear installations or R&D laboratories where potentially nuclear and other “dual-use” technologies are being researched or handled. It should be emphasized that this sanction is process-driven and is designed to deter the professional scientist from engaging in misconduct. It is quite independent of any event-driven “after the misconduct” application of any law, such as violation of “deemed export” regulations, that may be applied by the state in any particular case.

But, alas, there will perhaps always be the odd “scientific suicide” bomber who will sacrifice his career and profession for the sake of a warped ideology, or a one-time windfall.

4. V.Siddhartha, “Scientific Licence”, Correspondence, *Nature* **351**, 263- 263 (23 May 1991)