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A Code of Ethics on Arms R&D for Scientists and Engineers

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ABSTRACT

Scientists and engineers make significant contributions to the technical monitoring of arms control agreements. International organizations and professional scientific and engineering societies can now make another contribution by formulating an ethical code requiring individual scientists and engineers to refrain from taking part in any research and development activities that violate international law or arms control agreements between nations. International organizations and professional societies should publicize the code, create objective review processes, and implement measures to protect individuals who report possible violations of international law.

SCIENTISTS AND ARMS CONTROL

Scientists and engineers have made contributions to military technology for millennia but it has only been relatively recently that scientists as individuals, small groups, and organizations have taken it upon themselves to attempt to influence policy in a significant way. This may have been a consequence of the technological intensity of two world wars in this century characterized by the development of integrated systems of radar, missiles, methods of aerial bombardment, and weapons of mass destruction that inflicted heavy damage on civilian populations. For example, during the U.S. program to develop nuclear weapons, a small group of scientists led by James Franck, Eugene Rabinowitch, and Leo Szilard raised the issue of whether these weapons should be used. They were concerned with the effects of these weapons on postwar policy as well as with their potential for inflicting grievous damage on non-combatants. The committee recommended that a demonstration explosion of a nuclear weapon be used to compel a surrender before the weapon was actually used against Japan.

After the war ended in 1945, the work of the Franck Committee was taken up in the U.S. by the newly organized Federation of Atomic Scientists and by its UK counterpart, the Atomic Scientists Association headed by the distinguished physicist R.E. Peierls. Both of these groups were composed primarily of scientists who had taken part in the nuclear weapons projects of their countries. The aims of the UK group were:

1. To bring before the public the true facts about atomic energy and its implications.
2. To investigate and make proposals regarding the international control of atomic energy whenever the political situation makes this appropriate.

3. To help shape the policy of this country in all matters relating to atomic energy.¹

Since that time, many non-governmental organizations have made significant efforts to achieve these goals internationally and in their own countries. They include ISODARCO, Pugwash, the Natural Resources Defense Council, and many other national and international movements. Many scientific societies have also made strong contributions to these efforts by organizing non-partisan study groups and providing forums for discussion of arms control and defense policy issues at their meetings and in their journals. These organizations and societies recognize that the use of applied science and advanced technology in the development of modern weapon systems imposes a special obligation to inform policy makers and the wider community of the risks associated with them. This is most readily apparent in the case of weapons of mass destruction, but it also applies to less visible weapons such as antipersonnel land mines. The most effective of these groups have learned to use forums such as conferences, professional journals, and regular contacts with media organizations. The American Physical Society and other U.S. groups have supported fellowships which placed competent scientists in governmental bodies (such as Congressional staffs) in the U.S. to provide law makers with non partisan technical advice. Many individual scientists take part in these efforts and their technical contributions are sometimes recognized and rewarded by their institutions.

A ROLE FOR SCIENTISTS IN SECURITY POLICY?

It has not always been easy for individual scientists to speak out on security issues. Some have had personal involvement in government-supported R&D and are subject to classification rules. Others argue that technical expertise does not give them any special right to inject their views into policy matters. Some oppose the involvement of their professional societies in activities they perceive to be “political.” Those holding this view often argue that while scientists have a right to speak as individuals, scientific societies have no business claiming to speak for all of their members in matters where member opinions may be sharply divided.

Nevertheless, some scientists have been outspoken in advocating strong interactions with the public even at the risk of alienating their colleagues (and perhaps the same public they seek to inform). The history of scientists’ efforts to influence arms control and disarmament policy of their nations during the height of the Cold War, 1945-81, is clearly presented in Joseph Rotblat’s book, *Scientists, the Arms Race, and Disarmament*.²

For example, in the early 1950s, during the debate over the decision to proceed with the development of thermonuclear weapons, F.C. Champion of King’s College, London, wrote:

The decision to proceed with the development of the hydrogen bomb, while staggering in the magnitude of its implications for the misery of mankind, is yet only one striking example of the prostitution of scientific research for military

¹ Atomic Scientists News, Vol. III, No. 4, March 1950

² Joseph Rotblat, Ed., *Scientists, the Arms Race, and Disarmament*, Taylor & Francis Ltd. (UNESCO), London, Paris 1982

purposes and power politics... There is a tendency among members of the public to regard those scientists who conduct this research as clever and inhuman villains, who devise devilish inventions for the destruction of humanity. On the other hand, those scientists who refuse to engage in such research are often, by the same public, branded as little better than traitors who refuse to support their country...Let no one, however, conclude that (refusal) would be a soft option. In this modern age the shadow of the gas chamber lies heavy across defenseless peoples.³

Other scientists such as Max Born proposed that scientists persist:

There is no doubt that the ordinary citizen is disgusted that science has been degraded to a tool in power politics and an instrument of mass destruction. The only remedy seems to me a violent moral reaction against the misuse of science. Scientists should organize themselves with the aim to outlaw the prostitution of science. Though I am too old to lead, I should willingly join such a group, which might start with an attempt to formulate a code of behavior like that in medicine since the days of Hippocrates. This would immensely strengthen the individual scientist in the difficult choice between his moral and religious conviction and his loyalty to the state.⁴

AN ETHICAL CODE FOR SCIENTISTS

This brief history suggests that it would be difficult to formulate a generally accepted code of conduct for the involvement of scientists in military research. However, the approaching millenium is an opportune time to take up part of Max Born's challenge and generate a statement of ethical conduct for scientists with respect to their participation in R&D activities that are prohibited by international law.

Many engineering societies have codes of ethics.⁵ For example the Institute of Electrical and Electronic Engineers (IEEE) code contains the following guidelines:

Members shall, in fulfilling their responsibilities, to the community: Protect the safety, health, and welfare of the public and speak out against abuses in these areas affecting the public interest.

The code also recognizes that some matters must be kept confidential:

Members shall keep information on the business affairs or technical processes of an employer or client in confidence while employed and, and later, until such information is properly released, provided such actions conform with other parts of this Code.

Comparable language appears in the codes of other engineering societies, and the engineering literature is rich in discussions of ethical issues. Some organizations of

³ F.C. Champion, *Atomic Scientists News*, London, March 1950

⁴ Max Born, letter, *Atomic Scientists News*, London, March 1950.

⁵ Robert F. Ladenson, et al., *A Selected Annotated Bibliography of Professional Ethics and Social Responsibility in Engineering*, Center for the Study of Ethics in the Professions, Illinois Institute of Technology, 1980.

social scientists such as the American Sociological Society have developed codes of ethics for their members. That society recognizes that

Sociologists who work in organizations providing a lesser degree of autonomy than academic settings may face special problems. In satisfying their obligations to employers, sociologists in such settings must make every effort to adhere to the professional obligations contained in this code...and should be aware of the possible constraints on research and publication in those settings and should negotiate clear understandings about such conditions accompanying their research and scholarly activity.

In the U.S., the American Association for the Advancement of Science (AAAS) has provided leadership in the scientific community on ethical matters through the work of its Committee on Scientific Freedom and Responsibility and the Professional Society Ethics Group. The New York Academy of Sciences has sponsored conferences dealing with ethical issues in military research. The National Science Foundation has sponsored research and related activities on ethics and value issues.

In 1987, the Committee on the Military Use of Biological Research of the Council for Responsible Genetics led by M.I.T. biologist Jonathan King organized a petition campaign and collected more than 1,000 signatures of scientists who pledged they would not participate in biological weapons work.⁶

Given these distinguished precedents, it is appropriate that we take the next step and formulate a statement codifying the obligation of all scientists to refrain from participating in any research and development activity that is clearly prohibited by international law. That statement could be drafted by any of the organizations listed above and proposed to the International Council of Scientific Unions for dissemination to all scientific bodies. Its formulation could be simple:

Scientists, engineers, and scientific and technical professionals should not participate in any research and development or scientific or technical support activity in violation of international arms control agreements to which their nations are signatories.

What would define a treaty-violating activity? That judgment can only be made after careful verification based on the results of inspection. Any government considering the initiation of a treaty-violating activity might be partially deterred by the possibility that one of its scientists might be motivated by the code to reveal the activity to an international organization.

PROMOTING ADHERENCE TO THE CODE

Adoption of an ethical code and wide acceptance by scientific societies and professional organizations would be an important first step. Scientific organizations can provide open forums for discussions of potential violations and help to sharpen distinctions between work in legitimate security areas and prohibited activities. Anthrax vaccine development is permitted; the development of anthrax weapons is

⁶ Jonathan King, "Resisting the Militarization of Biological Research," *Genewatch*, vol. 4, pp. 4-5, July-October, 1987

not. Does the release of nuclear energy in a laser fusion experiment constitute a CTBT violation? There should be forums where such issues can be discussed without fear of reprisal.

The very existence of a code may help to deter some governments from initiating treaty-violating activities. While it would not be a panacea, a widely accepted statement of ethics bearing on the participation of scientists in R&D activities prohibited by international treaty would provide incentives for scientists to resist pressures from their governments. Scientists would know that refusal to participate would be approved by their professional colleagues and international community. Graduate students who will seek professional positions may be particularly reluctant to have the quality of their degrees diminished by any association with a treaty-violating activity. The code should be widely distributed through journals and other organizational means.

Universities would have a special responsibility. It is not unusual for most graduate students to have had little formal exposure to discussions of scientific ethics in their training. Most ethical precepts are acquired by informal exchanges with mentors and fellow students. After they complete their degrees, they serve on peer review panels where they are likely to meet strong role models. The record suggests that the vast majority behave ethically. In this informal context, it would not be difficult to impart an awareness that certain forms of weapons R&D are prohibited by international law and ensure that researchers, students, and support workers understood the meaning of the code. Ethical issues related to arms agreements would also be appropriate for discussion at university colloquia, conferences of scientific and engineering professionals and in forums involving the general public and mass media.

In addition to a proposed ethical code, it is also important to consider mechanisms which scientists could use to bring potential violations to the attention of the world community. That will hardly be a simple matter since disclosure may be prohibited by law, regulation, or coercion. Many persons have written about the problem of disclosure of governmental or corporate misconduct in the U.S. American public interest advocate Ralph Nader suggests that in a national context, the issue involves the need to decide at what point allegiance to society must supersede allegiance to an organization's policies.⁷ Nader frames the issue in terms of individual freedom, concentration of corporate or state power, and the need to provide information to the public. He suggests that the individual considering the release of information consider the following questions:

- Is the knowledge accurate?
- What public interests are being harmed?
- How far can one go within the organization to seek correction?
- Will I violate rules or laws by going outside the organization?
- Will I violate rules or laws by *not* going?
- Shall I release the information overtly, anonymously, or resign?
- What is the likely response?
- What is to be achieved?

⁷ Ralph Nader, P.J. Petkas, and K. Blackwell, Eds., *Whistle Blowing*, Grossman Publishers, New York, 1972

Nader's questions were proposed in a context that assumed that the issue involved was a national rather than an international one, but some of the same points would apply to arms treaty violations. However, a government developing a clandestine weapon program in violation of international law is not likely to react benignly to a scientist threatening to release information about it. Rosemary Chalk and Frank von Hippel have written about the need to work through channels if possible but to be prepared to go outside if necessary to reveal corporate or government misconduct.⁸⁹ They also point out that nations (or by inference, international organizations) must create laws and policies to protect individuals who choose to make their complaints public and provide forums for open and balanced review. In 1993, George Stanford and his colleagues at Argonne National Laboratory submitted a proposal to the U.S. Department of Energy to undertake a study of optimum methods of providing incentives and protection to scientists who reveal violations of international arms control agreements.¹⁰ Others have written about "societal verification" of arms control agreements in the same spirit and have suggested ways of using public key encryption to communicate with responsible international bodies.¹¹

One or more international organizations should be designated as clearinghouses to receive complaints about violations of arms control agreements. These organizations should also create a set of procedures for reviewing allegations and protecting individuals who come forward, including the guarantee of anonymity if the individual requests it. In cases where the individual may be subject to physical coercion or punishment, these organizations should also provide mechanisms to provide political asylum. Finally, the clearinghouse organizations should submit annual reports to appropriate bodies in the United Nations.

RECENT ALLEGATIONS OF TREATY OR AGREEMENT VIOLATIONS

Biological and chemical weapons pose difficult verification problems.¹² Recent reports suggest that in the 1970s and 1980s, Iraqi scientists were forced to participate in a project to develop a nuclear weapon concealed in a civilian nuclear program despite Iraq's ratification of the non-proliferation treaty.¹³ Iraqi scientists who fled to other countries say that Saddam Hussein used threats of imprisonment and torture to compel scientists to take part in this violation of international law. Many western companies were all too willing to sell dual use equipment to Iraq. They provided reactor equipment, reprocessing facilities, mainframe computers, and machine tools for the Iraqi project. The companies say their actions were legal at the time in the absence of export regulations, even though they suspected that Iraq might use the equipment for military purposes in its war with Iran. Only in the aftermath of the Gulf War did the extent of Iraq's nuclear weapon project become clear.

⁸ Rosemary Chalk, "The Miners' Canary," *Bulletin of the Atomic Scientists*, Vol. 38, No. 2, Feb. 1982

⁹ Rosemary Chalk and Frank von Hippel, "Due Process for Dissenting Whistle Blowers," *Technology Review*, June-July 1979.

¹⁰ George Stanford, "Disincentives to Proliferation and Arms Control Cheating Through Rewarding and Protecting Whistleblowers," Argonne National Laboratory proposal, January 11, 1993.

¹¹ Richard L. Garwin, "Societal Verification," 5th Annual Isodarco-Beijing Conference on Arms Control, Chengdu, China, Nov. 1996.

¹² Helen Gavaghan, "Arms Control Enters the Biology Lab," *Science*, Vol. 281, 3 July 1998, pp. 29-30.

¹³ Judith Miller and James Risen, "Defector Describes Iraq's Atom Bomb Push," *New York Times*, 15 August, 1998.

In 1991, Russian chemist Vil Mirzayanov and Lev Federov, president of the Russia's Union of Chemical Safety, reported that Moscow was secretly developing and testing new chemical weapons despite a 1990 bilateral agreement with the U.S. to reduce their chemical stockpiles. The Russian government denied this allegation.¹⁴ Mirzayanov was imprisoned twice for making this claim. In 1995, he published an article asserting that security was lax around Russian chemical weapons stockpiles and that safety standards were violated routinely. The Russian government denied those allegations and Mirzayanov lost his job.

In 1989, a Soviet biochemist, Vladimir A. Pasechnik, defected to the UK and reported that his Leningrad institute had worked on the preparation of plague bacteria for use in biological weapons. Russian biological weapons expert, Ken Alibek, defected to the west in 1992 and published claims that the Russians had continued to engage in the production of biological weapons through the 1980s even though they were a party to the 1972 Biological and Toxin Weapons Convention prohibiting their production.¹⁵

In the aftermath of the nuclear tests by India and Pakistan (which violated no arms control agreements since those states are not party to NPT), some Indian scientists have argued that scientists should speak out if they oppose government science and technology policy. Such statements suggest that scientists in all countries would support a code of ethics on weapons research and development.¹⁶

The existence of an ethical code with an associated clearinghouse mechanism would also encourage scientists to become more vigorously involved in public policy debates in countries that are not likely to engage in arms control violations. In the U.S., for example, some national laboratory researchers have challenged U.S. policy to the evident displeasure of government authorities. Many observers believe that the national laboratories' willingness to tolerate such dissenting views (despite some not unexpected grumbling) strengthens rather than detracts from their capabilities and reputations for technical excellence.

CONCLUSION

The approaching millenium provides world organizations and the scientific community with an opportunity to take a strong stand on the importance of individual scientists' adherence to arms control agreements. An ethical code providing guidance for scientists and engineers would have a strong impact on a community that prides itself on peer review and ethical behavior. A code would support the decisions of individual scientists who choose not to participate in treaty-violating activities. The establishment of a code and mechanisms to protect individuals who publicize violations would also help to strengthen public confidence in science and technology and build support for a research enterprise that is needed to generate new knowledge that can be applied to emerging problems of the new millenium.

¹⁴ David Hoffman, "Soviets Reportedly Built Chemical Weapon Despite Pact With U.S.," *Washington Post*, 16 August 1998.

¹⁵ Wendy Orent, "Escape from Moscow," *The Sciences*, New York Academy of Sciences, May/June 1998

¹⁶ Kalpana Sharma, "Why Don't They Speak Out?" *The Hindu*, Sept. 9, 1998

In 1983, Pope John Paul II addressed the Pontifical Academy of Sciences.¹⁷ His discourse urged scientists to refuse to participate in certain forms of research “inevitably destined to be used for deadly purposes.” While scientists and policy makers may debate how science should be applied to matters of national security, there ought to be no argument that research and development must not violate international law. In John Paul’s words,

All knowledge takes its nobility and dignity from the truth that it expresses. Only in the unbiased pursuit of truth do culture and science preserve their freedom and defend themselves from any attempt at manipulation by ideologies or powers.

An ethical code that entreats members of the international scientific community to refrain from violating arms control agreements can complement confidence-building measures. Its creation would strengthen the role of diplomacy and international law in preventing deadly conflict. An affirmative statement of the code would help break commonly held stereotypes of scientists and remind citizens asked to support the research enterprise that science and technology are forces for peace and security.

¹⁷ “Discourse to the Pontifical Academy of Sciences,” New York Times, 13 November 1983.