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Science between freedom and responsibility

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The post Second World War period was a good time for modern science-driven technology; it had played a decisive part in the allied victory and now it was to be harnessed to the task of postwar reconstruction, promoting increased welfare, better health and improved security. But there were also misgivings related to the freedom in the conduct of science. Could science be freely pursued under the terms of a social contract so inextricably intertwined with national security concerns? After the end of the Cold War, new concerns emerged. The security element in the old contract had acquired a new meaning and was now understood in the sense of a protected environment, safe living conditions and future sustainability. Previously, science was the problem solver. Now science came to be seen as a major source of the problems. We have seen a shift from issues of freedom and trust to questions of responsibility and accountability. How should science respond?

The social contract.

In the half-century after the Second World War there was an implicit social contract between society and science. Science emerged from the war with almost universal respect. In the post-war years this respect was turned into a belief in the ability of science to solve, or at least to contribute significantly to the solution of, the major problems facing the nations. Science seemed worthy of this trust. The wealth of nations increased, medical research led to improved health, and scientists were essential in building a security system in the Cold War years. But welfare, health, and security are not without cost; the contribution of society to the social contract was a generous and long-term economic support of basic science.

The security factor was of particular importance, as shown by several recent contributions to the post-war history of science and technology. One prime

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example is the development at US universities, in particular Stanford and MIT, of high-technology areas such as electronics, control theory, high-energy and reactor physics, material science, and space science. These examples show a common pattern. From the military side we see a clear understanding of the importance of research as a generator of both products and experts. On the university side we find the entrepreneurs who knew how to formulate the right kind of priorities and to transform these priorities into saleable research programmes. Both the military and the universities were interested in stability and predictability. This led to long-term programmes with almost exclusively federal support.

In this situation freedom in the conduct of science – across national and political boundaries – became a major concern of the community. But was this at all possible in the Cold War context? Could science be freely pursued under the terms of a social contract so inextricably intertwined with national security concerns?

ICSU and the free conduct of science

Freedom of thought and enquiry is never easily won. General principles of freedom, which would also seem to ensure freedom in the conduct of science, had been set out in the United Nations *Declaration of Human Rights* in 1948. Freedom of enquiry seemed also to be guaranteed under the social contract, at least in some countries. In a very influential report, *Science: The Endless Frontier*, which Vannevar Bush addressed to President Roosevelt in 1945 after the war, we read:

> Scientific progress on a broad form results from the free play of free intellects, working on subjects of their own choice, in the manner dictated by their curiosity.

It is one thing to make splendid declarations, another their observance. Did real freedom in the conduct of science become a part of the social contract?

The International Council for Science (ICSU), which until 1998 was named the International Council of Scientific Unions, was created in 1931 to promote international cooperation in the different branches of natural and bio-medical science. It is a non-governmental organization working closely with UNESCO. It has two categories of members: national scientific academies and international scientific unions. ICSU coordinates large international programmes such as the International Geosphere-Biosphere Programme and is a partner in many international collaborations, including Antarctic, oceanic, space and water research. It also has a number of bodies addressing matters of concern to all scientists, such as capacity building in science, which is aimed particularly at the developing countries. In these and many other matters ICSU is increasingly being called upon to act as the spokesman for the world scientific community and as an advisor in matters ranging from ethics to the environment.

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Freedom in the conduct of science has always been a prime concern to ICSU. But 'freedom of conduct' is a difficult concept, and what ICSU can achieve is limited. ICSU therefore chose to focus on the international aspect, i.e. the right of scientists of any country or territory to adhere to, or to associate with, international scientific activity without regard to race, religion or political philosophy. This could be achieved in different ways. One example is an ICSU committee such as COSPAR (Committee on Space Research), which provided during the Cold War years a meeting place for scientists of all nationalities, including American, European, Russian and Chinese, to discuss common scientific issues without undue political constraints. In order to achieve this objective one must be assured of the freedom of travel.

Hence, in 1963 ICSU formed the *Standing Committee on the Free Circulation of Scientists*. This committee has been remarkably effective in helping scientists obtain visas to travel freely to ICSU sponsored activities. And since ICSU currently has 95 national members and 25 international union members, this means that almost all international scientific activities are ICSU-sponsored activities. This also means that ICSU can put some force behind its principles. If an exit or entry visa is not granted, ICSU has decided that no ICSU sponsored activity can take place in the offending country. This has turned out to be a remarkably powerful instrument for the successful implementation of the free circulation policy.

But problems remain. Who is a scientist? Should a country grant an entry visa to anyone who claims to be a scientist? ICSU has tried to solve this problem by introducing the notion of the *bona fide* scientist, which means that a person must be able to demonstrate to the organizers of an ICSU sponsored meeting that he or she is a rightful member of the appropriate scientific community, before their visa application can be supported.

Another problem occurs when there is a conflict between accepted principles or norms. One such case, causing much trouble to the international scientific community, concerned South-African participation in the times of apartheid policy. I was personally involved in one such incident in Norway. Official Norwegian national policy, in accordance with the appropriate UN resolutions, required a total boycott of South-African participation in cultural, educational and scientific events in Norway. ICSU insisted on free access of *bona fide* scientists at ICSU sponsored meetings. It required long negotiations with both ICSU and the Norwegian Foreign Office before we reached a solution that satisfied both. Visas would be granted to any *bona fide* participant who came as an *individual*, and not as a *representative* of his or her own government. The situation is quite typical and an everyday experience to any lawyer. There is a difference between general norms or rules of law and concrete actions. Norm systems, as well as legal systems, are never complete and must be interpreted in any specific situation. This

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is not a question of revising the norm system to fit a specific situation, but a *recognition* of the need to sit down and argue every specific case in order to agree on a common action. In our case, the Norwegian Foreign Office continued to support the UN resolutions on the South-African boycott and ICSU continued to support its Principle of Free Circulation.

I have dealt with this example at some length for several reasons. First it is nice to be able to tell a success story, and the ICSU *Standing Committee on the Free Circulation of Scientists* was a great success. Next, it also shows that the freedom necessary for the social contract needs constant safeguarding. Freedom in the conduct of science proved essential. Through the free association of scientists across political boundaries, a common understanding was created and the mutual trust that was absolutely essential for the joint scientific and technological assessments leading up to the disarmament agreements of the 1980s was built.

After the end of the Cold War, free circulation and visa problems did not seem so urgent. After some years the 'freedom of circulation' committee was renamed the *Standing Committee on Freedom in the Conduct of Science* and tried to establish a new and broader agenda. But 'September 11' and the new and urgent political priority of preventing terrorist actions brought the old problems back. The freedom to travel and the need for control do not easily mix.

Between freedom and responsibility: renewing the social contract

The future of science is not what it used to be. The optimistic public perception that scientific insights and technological advances would provide a better future has suffered a severe setback. Such 'benefits' of scientific progress as atomic power, new chemical compounds and foodstuffs produced by genetic manipulation now generate uncertainty, even fear, as to what the future holds in store for man and nature. How has this change come about?

In reviewing the social contract we noted that the post-war period was a good time for modern science-driven technology; it had played a decisive part in the allied victory and now it was to be harnessed to the task of post-war reconstruction, promoting increased welfare, better health and improved security. The scientist had public trust.

The end of the Cold War and an increased awareness of environmental issues changed all this. Of the three elements of the old contract, health remains a major concern. Welfare seems to have split into two parts, wealth creation on the one side and meaningful employment on the other, the two parts not always being in harmony. The security element is the element that seems to have acquired a radical new meaning and is now to be understood in the sense of a protected environment, safe living conditions and future sustainability. In the post-war period, few were troubled if, at times, scientists and engineers showed little concern for the

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preservation of nature – after all, the aim of technology has always been to transform nature for the benefits of humanity, but there may be limits to what nature can tolerate.

Relatively few doubts were raised until the United Nations *World Commission on Environment and Development* issued its report, *Our Common Future*, in 1987. By that time there was growing concerns about the environmental problems that progress was bringing in its wake: the fossil fuels used in industrial developments were increasing the carbon dioxide content in the atmosphere, threatening to create a greenhouse effect; urbanization was eating into agricultural land and woodlands; industrial expansion was causing increased pollution and there was a loss of fresh water resources. Further ahead loomed the threat of loss of biodiversity.

In her Presidential Address, *Entering the Century of the Environment: A New Social Contract for Science*, delivered to the American Association for the Advancement of science in 1997, Jane Lubchenco discussed the changed situation and the challenges ahead. She noted that science has been successful and that it had earned the freedom and trust it enjoyed under the old contract. But she forcefully argued that the 'immediate and real challenges facing us have not been fully appreciated nor properly acknowledged by the community of scientists whose responsibility it is, and will be, to meet them'.

Responsibility and the ethics of scientific knowledge and technology

In writing the new social contract between science and society we have seen a shift from *freedom* and *trust* to issues of *responsibility* and *accountability*. This in turn means a new emphasis on the ethics of science and technology.

The renewed interest in ethics in society has a broader base. The Norwegian philosopher Dagfinn Føllesdal, in a recent article, lists several factors as reasons for this increased interest, such as a rapidly changing society, increased contact between cultures, new developments in science and technology, particularly in the biomedical field, and the relative weakening of the traditional bearers of ethical traditions during the last few generations, leading to a loss of certainty and, hence, to a lack of competence to give advice.

There have been many responses to these challenges. A renewed ethics for science has several components, some internal to the scientific community and some dealing with the relationship to the larger public. The first component is, to a large extent, a question of accountability and codes of behaviour. A recent survey by the ICSU *Standing Committee on Responsibility and Ethics of Science* (SCRES) noted 115 ethical standards or codes for science, 39 of them were international standards and 76 were national standards representing 23 countries

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on six continents. I shall return to codes and individual responsibilities in the next section. Here, I will discuss the ethics of science in relation to the public at large.

In 1998, the General Conference of UNESCO decided to create a *World Commission on the Ethics of Scientific Knowledge and Technology* (COMEST). There were several reasons for this. UNESCO had already created a special bioethics committee, but the mandate of UNESCO reaches beyond bioethics alone. It was an obvious task for UNESCO to extend the mandate of the bioethics committee to the broader field of scientific knowledge and technology. We also noted above the many initiatives recorded by the ICSU ethics committee. But questions about responsibility and accountability of science to society are matters of concern not only to academies and scientific unions. A renewed trust in science needs a broader constituency and this is where the UNESCO World Commission enters the picture. The mandate is broad. The Commission should:

- serve as an intellectual forum for the exchange of ideas and experiences;
- detect on that basis early signs of risk situations;
- fulfil an advisory role for decision-makers in this respect;
- promote dialogue between scientific communities, decision-makers and the public at large.

The mandate expresses a concern with ethical reflections and discourse. Being scientists brought up under the regime of the hypothetico-deductive methodology, we might have expected that the Commission would start from general principles. Perhaps even from a universal code of ethics, extracted from the observations of different cultures and communities and leading ultimately to advice on how to behave in specific situations. But neither science nor life conforms to textbook doctrines of scientific methodology. We have learned from many experiences that cultural diversity seems to negate any attempt to form a universal ethical code; recall the discussion above concerning norm conflict in relation to the issue of free circulation of scientists.

Thus, we see a shift from ethical theory to ethical discourse. In Føllesdal's article he gave three reasons for an argumentative strategy:

- First, we regard arguments as a way of trying to find which views are better than others. One main theme in moral philosophy, as in science, is to clarify why and how arguments can help us sort the good views from the bad ones.
- Second, arguments stimulate inquiry. In arguing for or against an issue, we discover that various factors are relevant to the issue, including factors we had not previously conceived and which it may become crucial to explore. For example: who is affected by what we are about

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to do, in which ways, with which probabilities, with what amount of freedom, and so on.

- Third, arguments demonstrate respect for the other. We approach the other as an autonomous human being, capable of making up his or her own mind, not as an entity to be manipulated by rhetorical devices and other strategies … If one uses the argumentative approach to ethics and wonders what one should do and why, the consequences of one's actions always play a central role, even if one also regards other factors, such as duty and intention as important.

The argumentative approach does not mean that theory and general principles are irrelevant; they are necessary guidelines in any ethical discourse. The emphasis will, however, be on concrete issues and situations. COMEST has, in the first round, decided to focus on four ethical themes: fresh water resources, energy, the information society, and outer space. Let me report on some of the activities.

In the ethics of fresh water resources COMEST has established a worldwide *Research and Ethical Network Embracing Water* (RENEW) in close cooperation with the International Hydrological Programme (IHP) to promote engagement and best practice in the issues involved in the sustainable use and equitable sharing of fresh water resources at all levels and in the handling of water-related emergencies.

In the ethics of outer space, COMEST has entered into a close cooperation with the UN *Committee on the Peaceful Uses of Outer Space* (COPUOS) to promote ethical principles for the safe and peaceful use and exploration of present and future human activities in outer space. This work has identified a number of value issues that have not yet been covered by international law. COMEST will implement the joint outcome of this study in close cooperation with national space agencies as well as with international organizations such as IAF (International Astronautical Federation) and COSPAR (the ICSU Committee on Space Research).

As a follow-up to the UN *World Summit on Sustainable Development* (WSSD) in Johannesburg in 2002, COMEST will, in the future, concentrate on the ethical issues of sustainability; in particular, how to argue about value issues in complex environmental situations. A first step in this direction will be a joint study with ICSU on the Precautionary Principle. This principle and its application are currently the object of some controversy, with different views taken in various parts of the world. There is a need for a careful and independent analysis to gain a better understanding of the principle itself and how it should be properly applied. The principle has potential implications for national and international environmental and health policies as well as for world trade. It is therefor important that the 'principle' can be sharpened to be more than a rhetorical figure.

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Responsibility and the individual scientist

A *World Conference on Science* organized by UNESCO and ICSU took place in Budapest in June 1999. ICSU's *Standing Committee on Responsibility and Ethics in Science* was asked to prepare a background paper on ethics and the responsibility of science. The paper recommended a number of actions to be taken, in particular, to establish national committees for ethics in science. These committees would need members who are competent both in science and ethics in order to deal properly with the complex ethical problems in science. They could also be called upon to help formulate codes and guidelines. But codes and guidelines are measures, which to a large extent are imposed on the community. What is needed is a sense of responsibility and a conviction coming from inside. We read in the background paper that:

> the ethical responsibility of the scientific community is ultimately borne by the individual scientist. It is she or he who decides how and whether to pursue a given line of research, what to do with the information obtained, and so on. … the ethical awareness of the individual scientist is of outmost importance.

In line with this view, the background paper recommends the adoption of international guidelines to govern all strands of science and research. Specific mention is made of the *Uppsala Code for Scientists* initiated by the *Pugwash Conference on Science and World Affairs*, where we read:

> Scientific research is an indispensable activity of great significance to mankind – for our description and understanding of the world, our material conditions, social life and welfare. Research can contribute to solving the great problems facing humanity, such as the threat of nuclear war, damage to the environment, and the uneven distribution of the Earth's resources … Yet research can also, both directly and indirectly, aggravate the problems of mankind. This code of ethics for scientists has been formulated as a response to a concern about the applications and consequences of scientific research. In particular it appears that the potential hazards deriving from modern technological warfare are so overwhelming that it is doubtful whether it is ethically defensible for scientists to lend any support to weapons development.

The Pugwash movement arose in direct response to the nuclear threats after the Second World War, and this is clearly reflected in the quote above. In her AAAS Presidential Address, *Entering the Century of the Environment*, Jane Lubchenco, the current President of ICSU, puts the environmental issue up front and there is little mention of war and the weapons industry. But both parties stress the responsibility of the individual.

This theme was taken up by Joseph Rotblat, former President of the Pugwash Conference and a winner of the Nobel Peace Prize, in his address to the *World Conference on Science*. He argued that the responsibility of the individual should

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find expression in some kind of oath, or pledge, to be taken by scientists when receiving a degree in science. Such a pledge would have an obvious symbolic value, but Rotblat hoped for something more, that 'it might generate awareness and stimulate thinking on the wider issues among young scientists'.

Rotblat's proposal of a pledge was not adopted by the *World Conference on Science* for reasons that are not easy to understand. In the *Framework for Action* there is a special section on ethical issues. In paragraph 71 of that section we read:

> Ethics and responsibility of science should be an integral part of the education and training of all scientists. It is important to instil in students a positive attitude towards reflection, alertness and awareness of the ethical dilemmas they may encounter in their professional life. Young scientists should be appropriately encouraged to respect and adhere to the basic ethical principles and responsibilities of science. UNESCO's World Commission on the Ethics of Scientific Knowledge and Technology (COMEST), in cooperation with ICSU's Standing Committee on Responsibility and Ethics of Science (SCRES), have a special responsibility to follow up on this issue.

The work is progressing. COMEST, in cooperation with ICSU, has now established a working group to give the necessary advice on how to integrate an awareness of, and competence in, ethics and the responsibility of science in the training of every young scientist.

A concluding remark

Science needs to rebuild trust. There is an urgent need for openness and dialogue on the complex issues facing science and society. In a recent book, *Academic Duty*, the former president of Stanford University, Donald Kennedy, points to a certain imbalance or lack of awareness in the scientific community. Freedom is a widely shared value. But freedom has a counterpart, duty, which means an acceptance of individual responsibility. Everyone – scientist or not – has a duty to see his or her activity in a broader social and ethical context. If this sense of duty is not translated into responsible action, freedom will be replaced by accountability, rules and regulations.

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