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World Commission on the Ethics of Scientific Knowledge and Technology

Draft 2

Ethics of Nanotechnology: Status Review

1 Introduction

Research in technologies at the atomic and molecular levels is rapidly growing worldwide. Their promising applications in medicine, manufacturing and communication range from the development of new drugs and diagnostic tools to the production of stronger and lighter materials as well as new and more efficient ways of energy production. Like any new technology, they raise hopes nourished by their potential benefits and fears of their possible harmful effects on the environment and humankind.

2 Review of past activities of COMEST

Nanotechnologies were first explored at the 3rd Ordinary Session in Rio de Janeiro in December 2003. A special session was held on nanotechnologies at the 4th Ordinary Session in Bangkok in 2005.

COMEST adopted a three-stage strategic approach.

In the first phase, a multidisciplinary group of experts was established. The group's mandate was to review the state of the art of ethical considerations on nanotechnologies and to identify opportunities for international action. The group of experts met at UNESCO in July 2005 and December 2005. Their work led, in 2007, to the publication of a book entitled *Nanotechnologies, Ethics and Politics* including in-depth information and extended substantive discussion.

The second phase entailed testing the relevance of potential international actions. Representatives of various sciences involved in the development and application of nanotechnologies examined the strategies and options proposed. The outline of a policy document was developed at the Extraordinary Session in Paris in 2006 and circulated to a selected group of individual scientists. The policy recommendations were adopted at the 5th Ordinary Session in Dakar in 2006. In parallel, and in order to raise awareness among Member States, a background brochure entitled *Ethics and Politics of Nanotechnology* was produced in 2006.

The third phase aimed at enhancing the political feasibility of potential actions. Consultations were undertaken with major significant stakeholders regarding the political feasibility of potential actions identified in the two previous phases. On the basis of this preliminary consultation process, a policy document in 6 languages on *Nanotechnologies and Ethics: Policies and Actions* was prepared for the UNESCO General Conference in 2007.

The policy document defined the central features of nanotechnology in terms of various distinct dimensions that combine to shape a complex ethical universe. Nanotechnologies rely on several sciences and technologies and have an interdisciplinary and transdisciplinary dimension. Among the issues that call for ethical consideration are the invisibility of nanoparticles and nanofibres, the rapid development of nanotechnologies, their military and security use, global impact; and the risk of a "nanodivide" between the developing and developed countries. The policy document described four types of action regarding nanotechnologies and ethics: articulating an ethical framework, awareness raising, ethics education, and research and development policies.

At the COMEST Extraordinary Session held in Paris in November 2008, COMEST members expressed their concern about the lack of visibility of the policy document and the failure to take steps towards implementation, given the serious ethical issues emphasized by past work. It was thus proposed to set a working group in the next biennium (2010-11), with the necessary resources,

which would then regularly update the policy document and document implementation strategies and policies adopted by various countries and make them available through the GEObs system. COMEST members were encouraged to make the policy document more visible in their country or region.

3 COMEST contributions and activities in 2009

(3.1) Nanotechnology and Ethics meeting in Brussels (April 2009)

COMEST members participated in a conference organized by the European research project “NanoCap” on the 2nd of April 2009 at the European Parliament in Brussels (Belgium) to discuss work and life with nanotechnologies. The “NanoCap” project seeks to promote the participation of trade unions and civil society organizations in public debates relating to social management of new technologies. Discussions were based on the health and environmental impacts of nanoparticles and nanofibres that have recently emerged as common concerns. Their use is becoming commonplace, yet little is known of their toxicity. Most importantly, workers and consumers directly involved in their usage have not been adequately consulted in the development and implementation of regulations. The meeting was an opportunity to bring to the attention of the audience the relevance of current and past COMEST work in nanotechnology ethics regarding this particular issue. The COMEST policy document was also distributed during the conference.

(3.2) Expert Meeting on Nanotechnologies and Ethics in Doha (May 2009)

In order to make the policy document more visible and to encourage its implementation, COMEST members participated in an expert meeting on nanotechnologies and ethics in the Arab region, organized by UNESCO and the Islamic Scientific, Educational and Cultural Organization (ISESCO), in May 2009 in Doha, Qatar. International and regional experts on nanotechnology research and ethicists met to discuss the specific ethical concerns of nanotechnology. The purpose of the meeting was to provide an overview of current research and applications in the field of nanotechnology in the Arab region as well as to identify ethical issues of nanotechnology and sensitize decision-makers and the community in large to them. The meeting also considered the possibility of a process that could lead to a “Declaration on Ethics of Nanotechnologies in Arab States”, to be finalized by UNESCO in full consultation with other relevant regional agencies and the global ethics of science community.

COMEST members participating in this meeting shared their thoughts and discussed issues ranging from development and the global impact of nanotechnology, to the social dimensions and security applications of nanotechnologies, with a wider group of expert participants and interested stakeholders. Consideration was given in particular to the applicability of existing normative frameworks (the 1974 Recommendation on the Status of Scientific Researchers and the 1999 Declaration on Science and the Uses of Scientific Knowledge), taking account of emerging issues, regional specificities, and the possible need for new normative developments at regional level.

The meeting provided an opportunity for nanotechnology experts from the Arab region to interact, exchange ideas and possibly start contacts and collaborations with prominent international nanotechnology experts.

The COMEST policy document was the background document on which all discussions were based.

4 Future directions for COMEST work on nanotechnology ethics in the biennium 2010-11

(4.1) At the Extraordinary Session of COMEST in 2008, it was proposed to set up a working group in the next biennium (2010-11), with the necessary resources, that could regularly update the policy document and document implementation strategies and policies adopted by various countries and make them available through the GEObs system.

COMEST might consider the creation of a working group on the ethics of nanotechnology. The working group may be composed of individual COMEST members along with representatives of ex officio members such as ICSU. In addition to the Division of Ethics of Science and Technology, it may consider working with other UNESCO units such as the Basic and Engineering Division and the Science Policy Division of the Natural Sciences Sector.

(4.2) At the COMEST Extraordinary Session in 2008, it was also suggested that COMEST's work on nanotechnologies in 2010-11 should include consideration of "convergence" issues.

COMEST might consider:

- *Collaboration with the European Parliament, Science and Technology Options Assessment (STOA). STOA produced a document on Technology Assessment on Converging Technologies (IP/A/STOA/SC.2005-183) in 2006. More specifically, this study focused on the convergence of nanotechnology, biotechnology, information technology and the cognitive sciences (NBIC). Among other issues, the document described the international public debate about NBIC convergence and discerned within the debate different visions of the future social consequences of NBIC convergence. It detailed the areas in which NBIC convergence is already occurring, the applications concerned, and the expectations associated with these, and offered a discussion on what the findings imply for the emerging public and political debate on NBIC convergence and the role policy makers and politicians may play. This document can be used as a reference base for further work and COMEST might use its expertise to introduce more ethical considerations into debate on NBIC convergence.*
- *Starting a process to develop a general framework and/or adapt on an ongoing basis codes of conduct or ethics codes related to converging technologies, noting that codes based on disciplines enforced by disciplinary scientific associations might be rendered obsolete by work in cutting-edge converging technologies.*

(4.3) At the Doha meeting on Nanotechnologies and Ethics, the experts present requested UNESCO to launch a process designed to lead to a "Declaration on the Ethics of Nanotechnologies in the Arab States", based on the COMEST policy document, to be finalized by UNESCO in full consultation with other relevant regional agencies and the global ethics of science community.

COMEST might consider asking the UNESCO Secretariat to develop a process for the next biennium (2010-11), with the necessary resources, the objectives of which might include:

- *The creation of a steering committee composed of 8-10 experts from relevant international organizations, COMEST members, engineers, ethicists, natural and social scientists, NGOs, IGOs and other stakeholders in the Arab region.*

- *A first meeting of the steering committee, possibly in Amman by the end of 2009, where the steering committee could produce a preliminary draft for consultation of such a Declaration.*
- *A consultation process in 2010, including formal involvement of Member States and National Commissions.*
- *A final draft to be adopted by States in the Arab region in 2011, possibly in conjunction with the Ordinary Session of COMEST.*
- *Endorsement of the Declaration on the Ethics of Nanotechnologies in the Arab States by the 36th UNESCO General Conference in 2011.*

Experts also requested that a framework be developed for improved access to nanotechnology resources and documents and research relating to nanotechnology ethics.

COMEST might consider:

- *Asking the Secretariat to explore the possibility of setting up a web-based platform to serve as a clearing house, in collaboration with the Natural Sciences Sector and other nanotechnology observatories.*
- *Collaboration with existing observatories e.g. ObservatoryNano, a European Commission funded project (FP7) the aim of which is to “create a European Observatory on nanotechnologies, to present reliable, complete and responsible science-based and economic expert analysis, across technology sectors, establish dialogue with decision makers and others regarding the benefits and opportunities, balanced against barriers and risks”; NanoTrust in Austria; or the Observatoire des Micro- et Nano-Technologies (OMNT) in France. COMEST could broaden the geographical range of these initiatives and extend them to the whole world through the GEObs system.*