Knowledge Society – Limits and Possibilities

Course 1001, Monsoon Term, 2010

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Week – 5

Session Anchor:

Centre for the Study of Culture and Society

General Conference
30th Session, Paris 1999

30 C

30 C/15
18 August 1999
Original: English

Item 4.6 of the provisional agenda

DECLARATION ON SCIENCE AND THE USE OF SCIENTIFIC KNOWLEDGE AND THE SCIENCE AGENDA - FRAMEWORK FOR ACTION

OUTLINE

Source: Item proposed by the Director-General; 156 EX/Decision 3.3.1, paragraph 3.

Background: The World Conference on Science was organized by UNESCO in cooperation with the International Council for Science (ICSU), from 26 June to 1 July 1999 in Budapest, Hungary, to help strengthen the commitment of UNESCO's Member States and other major stakeholders towards science education, research and development, and to define a strategy that would ensure that science responds better to society's needs and aspirations in the twenty-first century.

Purpose: The present document summarizes the preparatory phase and the immediate outcome of the World Conference on Science. The results of the Conference are embodied in two principal documents contained in Annexes I and III respectively: the *Declaration on Science and the Use of Scientific Knowledge*, serving to underscore the need for political commitment to the scientific endeavour and to the solution of problems at the interface between science and society; and the *Science Agenda - Framework for Action*, which provides a guide for fostering partnerships in science and the use of science for sustainable human development and the environment. Both documents, adopted by consensus by all participants at the World Conference, are submitted to the General Conference for adoption. A draft resolution for follow-up and implementation of the two documents is proposed by the Director-General.

Decisions required: paragraphs 27 and 28.

I. INTRODUCTION

1. The convening by UNESCO of the World Conference on Science for the Twenty-first Century: A New Commitment in 1999, in cooperation with the International Council for Science (ICSU), was approved by the General Conference at its 29th session as an integral part of the Programme and Budget for 1998-1999 (29 C/5 Approved, para. 02013).

2. The Conference was organized to help strengthen the commitment of UNESCO's Member States and other major stakeholders towards science education and research and development, and to define a strategy that would ensure that science responds better to society's needs and aspirations in the twenty-first century.

3. At the invitation of the Government of Hungary, the Conference was held in Budapest from 26 June to 1 July 1999.

4. The World Conference on Science was conceived as a process consisting of a preparatory phase, the Conference itself and a vigorous follow-up programme. UNESCO and ICSU were jointly responsible for the planning of the Conference, and the International Scientific Advisory Board (ISAB) of UNESCO gave valuable advice to this effect.

II. PREPARATORY PHASE

5. The preparatory phase comprised cooperation with, and consultation among, UNESCO's Member States and the scientific community, in particular national research bodies, academies and councils and scientific non-governmental organizations (NGOs). Other agencies of the United Nations system were also involved in the preparatory phase, as were some major intergovernmental organizations.

6. Within the Secretariat, the preparatory process was conducted jointly by the Sectors of the Natural Sciences and of the Social and Human Sciences in cooperation with the other sectors and units of the Organization.

7. The programme for the World Conference on Science was first drawn up by the UNESCO/ICSU Task Force for the World Conference on Science in March 1998. Advice was provided by the International Scientific Organizing Committee (ISOC) jointly created by the Director-General and the President of ICSU, the organizing Co-Presidents of the Conference, for the purpose.

8. The lists of keynote lecturers and chairpersons of the thematic meetings were finalized jointly by UNESCO and ICSU in March 1999 and reflected the desire expressed by Member States for balanced geographical representation, and the importance attached to scientific rigour.

9. The drafting of the preliminary versions of the two principal documents of the Conference, the *Declaration on Science and the Use of Scientific Knowledge (Declaration)* and the *Science Agenda - Framework for Action (Framework),* was carried out jointly by the Sectors of the Natural Sciences and of the Social and Human Sciences, in close cooperation with other UNESCO sectors and units, and with ICSU.

10. The consultation process began on 22 October 1998 when the draft *Declaration* was sent out to members of ISAB, ISOC and the Executive Board of ICSU. Copies were transmitted for information to all Permanent Delegations and National Commissions. A revised draft reflecting the comments and suggestions received from ISAB, ISOC and the ICSU Executive Board was dispatched for comment to National Commissions and Permanent Delegations on 11 January 1999. The draft *Declaration* was also sent for comment to the International Social Science Council (ISSC), the Third World Academy of Sciences (TWAS), national and regional academies of science and national research councils, to bodies of the United Nations system, intergovernmental organizations and to other non-governmental organizations. A copy of the draft conference programme was sent out with the draft *Declaration* in each instance. A further revision was prepared on the basis of comments received by the 10 March 1999 deadline.

11. The Terms of Reference for the preparation of the draft *Framework* were elaborated by the UNESCO/ICSU Task Force for the World Conference on Science and were revised and endorsed by the organizing Co-Presidents of the Conference in November 1998. The first version of the *Framework* was drafted jointly by the Sectors of the Natural Sciences and of the Social and Human Sciences, in co-operation with ICSU, and sent out to Member States on 26 March 1999, together with the revised draft *Declaration*, for comment by 14 May at the latest.

12. At its 156th session in June 1999, the Executive Board examined the report of the Director-General on the preparation of the World Conference on Science and the late March versions of the draft *Declaration* and *Framework* (156 EX/8), in accordance with 155 EX/Decision 3.3.1. The Members of the Board took note of the information provided in the report and invited the Director-General to submit the *Declaration* and the *Framework*, once approved by the World Conference on Science, to the General Conference at its 30th session (156 EX/Decision 3.3.1).

13. Coinciding with the wishes expressed by Members of the Executive Board at its 156th session, the *Framework* was significantly shortened, with the introductory material giving the rationale behind the core text being removed to a separate document that would not be subject to negotiation in Budapest. The draft *Declaration* and *Framework* were subsequently printed in the Organization's six official languages ready for distribution to participants in Budapest, along with an *Introductory Note*.

14. As part of the preparatory phase, UNESCO and ICSU had invited their partners to associate their own congresses and meetings with the Conference so as to widen the process of reflection involving scientists, governments and other members of society worldwide, and involve as wide a range of individuals as possible in the Conference process. In all, 63 meetings linked with the World Conference on Science were organized around the world in the period leading up to the event itself. These associated meetings - as they became known - played an important role in elaborating proposals and recommendations for participants in the Conference. The organizers of some 46 meetings accepted the invitation to submit reports for consideration during the final drafting of the *Declaration* and *Framework* by the Conference itself.

15. These reports of associated meetings were made available to delegates in printed form at the Conference itself and were placed at the disposal of the Drafting Group. The two principal documents reflect the input from many of these associated meetings.

III. FINAL DRAFTING AT THE CONFERENCE

16. Over 1,800 delegates representing 155 countries, including approximately 80 Ministers of Science and Technology, Research and Education or their equivalents, 28 intergovernmental organizations and more than 60 international non-governmental organizations, as well as industry and the media attended the World Conference on Science. Slightly fewer than one in four participants making up national delegates to the Conference were women.

17. The presentations and discussions in Forums I and II of the Conference had influence on the final wording of the two principal documents, the *Declaration* and *Framework*. Many of the 25 concurrent thematic meetings chose to transmit specific proposals for amendment to the Drafting Group.

18. A Special Forum was held on 30 June 1999 at which the five intergovernmental programmes of UNESCO and the international programmes of ICSU on environment and sustainable development were presented.

19. An International NGO Consultation organized on the mornings of 27 and 28 June 1999 gave an opportunity to the non-governmental organizations for making a collective submission to the Drafting Group on the two principal documents.

20. The International Forum of Young Scientists organized by the Hungarian authorities in Budapest on 23 and 24 June as a satellite event to the Conference and attended by 150 young scientists from 57 countries, transmitted a number of proposed amendments to the Drafting Group.

21. The recommendations of a number of major conferences convened by United Nations organizations in recent years were also taken into consideration by the Drafting Group.

22. In parallel to the official Conference programme, a number of ad hoc regional meetings and other events were organized to take advantage of the large numbers of ministers, high-ranking officials and internationally recognized scientists attending the Conference. These parallel meetings, whilst not having formal input to the drafting process, no doubt had influence on the viewpoints of delegates and delegations; they are also expected to give fresh impetus to regional and subregional cooperation.

23. By the deadline for submission of proposed amendments to the draft *Declaration* and *Framework* over 50 national or institutional submissions proposing more than 500 specific wording changes had been received.

24. The Drafting Group met over a two-day period on 29 and 30 June 1999 under the chairmanship of the Conference Rapporteur-General to consider all proposed amendments to the *Declaration* and *Framework*. The Group was open-ended in nature, but had a core membership decided by the Conference and consisting of two members nominated by each of UNESCO's six electoral groups, one representative of ICSU, one representative of the International Social Science Council (ISSC), one representative of the bodies of the United Nations system and one of an intergovernmental organization outside the system, as well as two representatives of non-governmental organizations. The Drafting Group's decisions on amendments were taken by consensus.

25. At the final session of the Conference, on the afternoon of 1 July 1999, the participants adopted by consensus the *Declaration* and the *Framework*, as amended by the Drafting Group.

26. In accordance with 156 EX/Decision 3.3.1, the Director-General appends, as Annexes I and III to the present document respectively, the *Declaration* and *Framework for Action*, as adopted by the World Conference on Science. He also presents, as Annex II and for information purposes only, the *Introductory Note to the Science Agenda - Framework for Action*.

IV. ADOPTION OF THE DECLARATION ON SCIENCE AND THE USE OF SCIENTIFIC KNOWLEDGE AND THE SCIENCE AGENDA - FRAMEWORK FOR ACTION

27. In the light of the above, the General Conference may decide to adopt the following resolution:

The General Conference,

Having examined document 30 C/15,

Adopts the *Declaration on Science and the Use of Scientific Knowledge* and the *Science Agenda - Framework for Action*.

28. In addition, it may also decide to adopt the resolution set out below concerning conference follow-up and implementation of the two documents:

The General Conference,

Considering the *Declaration on Science and the Use of Scientific Knowledge* and the *Science Agenda - Framework for Action*, which were adopted on this ….. day of November 1999,

1. Urges Member States:

   (a) to make both documents widely known among decision-makers and members of their scientific communities, to promote the principles set out in the *Declaration*, and take appropriate steps, including the introduction of national initiatives, subregional and regional consultations and cooperation, in order to translate into concrete action the *Science Agenda - Framework for Action* by implementing the recommendations contained therein;

   (b) to keep the Director-General regularly informed of all measures they have taken to implement the *Science Agenda - Framework for Action*;

2. Invites the Director-General:

   (a) to assist Member States in devising appropriate measures to implement the recommendations of the World Conference on Science and to undertake consultations with governments and national scientific institutions, international governmental and non-governmental organizations throughout

the biennium with a view to identifying regional priorities for implementation;

(b) to reorient UNESCO's own programmes in the basic, engineering and environmental sciences, as well as those in the social and human sciences, to take into account the outcome of the Conference;

(c) to direct efforts towards forging new partnerships involving intergovernmental organizations and non-governmental organizations, in particular the International Council for Science (ICSU), as well as the private sector, in the application of integrated and interdisciplinary approaches to addressing complex issues of sustainable development;

(d) to transmit both Declaration and Framework documents to the Secretary-General of the United Nations for appropriate action;

(e) to prepare, in conjunction with ICSU and no later than 2001, an analytical report to governments and international partners on the returns of the World Conference on Science, the execution of follow-up and further action to be taken.

ANNEX I

DECLARATION ON SCIENCE AND THE USE OF SCIENTIFIC KNOWLEDGE

PREAMBLE

1. We all live on the same planet and are part of the biosphere. We have come to recognize that we are in a situation of increasing interdependence, and that our future is intrinsically linked to the preservation of the global life-support systems and to the survival of all forms of life. The nations and the scientists of the world are called upon to acknowledge the urgency of using knowledge from all fields of science in a responsible manner to address human needs and aspirations without misusing this knowledge. We seek active collaboration across all the fields of scientific endeavour, i.e. the natural sciences such as the physical, earth and biological sciences, the biomedical and engineering sciences, and the social and human sciences. While the Framework for Action emphasizes the promises, the dynamism but also the potential adverse effects that came with the natural sciences, and the need to understand their impact on and relations with society, the commitment to science, as well as the challenges and the responsibilities set out in this Declaration, pertain to all fields of the sciences. All cultures can contribute scientific knowledge of universal value. The sciences should be at the service of humanity as a whole, and should contribute to providing everyone with a deeper understanding of nature and society, a better quality of life and a sustainable and healthy environment for present and future generations.

2. Scientific knowledge has led to remarkable innovations that have been of great benefit to humankind. Life expectancy has increased strikingly, and cures have been discovered for many diseases. Agricultural output has risen significantly in many parts of the world to meet growing population needs. Technological developments and the use of new energy sources have created the opportunity for freeing humankind from arduous labour. They have also enabled the generation of an expanding and complex range of industrial products and processes. Technologies based on new methods of communication, information handling and computation have brought unprecedented opportunities and challenges for the scientific endeavour as well as for society at large. Steadily improving scientific knowledge on the origin, functions and evolution of the universe and of life provides humankind with conceptual and practical approaches that profoundly influence its conduct and prospects.

3. In addition to their demonstrable benefits, the applications of scientific advances and the development and expansion of human activity have also led to environmental degradation and technological disasters, and have contributed to social imbalance or exclusion. As one example**,** scientific progress has made it possible to manufacture sophisticated weapons, including conventional weapons and weapons of mass destruction. There is now an opportunity to call for a reduction in the resources allocated to the development and manufacture of new weapons and to encourage the conversion, at least partially, of military production and research facilities to civilian use. The United Nations has proclaimed the year 2000 as the International Year for the Culture of Peace and the year 2001 as the United Nations Year of Dialogue among Civilizations as steps towards a lasting peace; the scientific community, together with other sectors of society, can and should play an essential role in this process.

4. Today, whilst unprecedented advances in the sciences are foreseen, there is need for a vigorous and informed democratic debate on the production and use of scientific knowledge. The scientific community and decision-makers should seek the strengthening of public trust and support for science through such a debate. Greater interdisciplinary efforts, involving both natural and social sciences, are a prerequisite for dealing with ethical, social, cultural, environmental, gender, economic and health issues. Enhancing the role of science for a more equitable, prosperous and sustainable world requires a long-term commitment of all stakeholders, public and private, through greater investment, review of investment priorities accordingly, and the sharing of scientific knowledge.

5. Most of the benefits of science are unevenly distributed, as a result of structural asymmetries among countries, regions and social groups, and between the sexes. As scientific knowledge has become a crucial factor in the production of wealth, so its distribution has become more inequitable. What distinguishes the poor (be it people or countries) from the rich is not only that they have fewer assets, but also that they are largely excluded from the creation and the benefits of scientific knowledge.

6. We, participants in the World Conference on "Science for the Twenty-first Century: A New Commitment", assembled in Budapest, Hungary, from 26 June to 1 July 1999 under the aegis of the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the International Council for Science (ICSU):

Considering:

7. where the natural sciences stand today and where they are heading, what their social impact has been and what society expects from them,

8. that in the twenty-first century science must become a shared asset benefiting all peoples on a basis of solidarity, that science is a powerful resource for understanding natural and social phenomena, and that its role promises to be even greater in the future as the growing complexity of the relationship between society and the environment is better understood,

9. the ever-increasing need for scientific knowledge in public and private decision-making, including notably the influential role to be played by science in the formulation of policy and regulatory decisions,

10. that access to scientific knowledge for peaceful purposes from a very early age is part of the right to education belonging to all men and women, and that science education is essential for human development, for creating endogenous scientific capacity and for having active and informed citizens,

11. that scientific research and its applications may yield significant returns towards economic growth, sustainable human development, including poverty alleviation, and that the future of humankind will become more dependent on the equitable production, distribution and use of knowledge than ever before,

12. that scientific research is a major driving force in the field of health and social care and that making further use of scientific knowledge has great potential for improving the quality of health for humankind,

13. the current process of globalization and the strategic role of scientific and technological knowledge within it,

14. the urgent need to reduce the gap between the developing and developed countries by improving the scientific capacity and infrastructure in developing countries,

15. that the information and communication revolution offers new and more effective means of exchanging scientific knowledge and advancing education and research,

16. the importance for scientific research and education of full and open access to information and data belonging to the public domain,

17. the role played by the social sciences in the analysis of social transformations related to scientific and technological developments and the search for solutions to the problems generated in the process,

18. the recommendations of major conferences convened by the organizations of the United Nations system and others, and of the meetings associated with the World Conference on Science,

19. that scientific research and the use of scientific knowledge should respect human rights and the dignity of human beings, in accordance with the Universal Declaration of Human Rights and in the light of the Universal Declaration on the Human Genome and Human Rights,

20. that some applications of science can be detrimental to individuals and society, the environment and human health, possibly even threatening the continuing existence of the human species, and that the contribution of science is indispensable to the cause of peace and development, global safety and security,

21. that scientists with other major actors have a special responsibility for seeking to avert applications of science which are ethically wrong or have adverse impact,

22. the need to practise and apply the sciences in line with appropriate ethical requirements developed on the basis of an enhanced public debate,

23. that the pursuit of science and use of scientific knowledge should respect and maintain life in all its diversity, as well as the life-support systems of our planet,

24. that there is a historical imbalance in the participation of men and women in all science-related activities,

25. that there are barriers which have precluded the full participation of other groups, of both sexes, including disabled people, indigenous peoples and ethnic minorities hereafter referred to as disadvantaged groups,

26. that traditional and local knowledge systems as dynamic expressions of perceiving and understanding the world, can make and historically have made, a valuable contribution to science and technology, and that there is a need to preserve, protect, research and promote this cultural heritage and empirical knowledge,

27. that a new relationship between science and society is necessary to cope with such pressing global problems as poverty, environmental degradation, inadequate public health, and food and water security, in particular associated with population growth,

28. the need for a strong commitment to science on the part of governments, civil society and the productive sector, as well as an equally strong commitment of scientists to the well-being of society,

Proclaim the following:

1. Science for knowledge; knowledge for progress

29. The inherent function of the scientific endeavour is to carry out a comprehensive and thorough inquiry into nature and society leading to new knowledge. This new knowledge provides educational, cultural and intellectual enrichment and leads to technological advances and economic benefits. Promoting fundamental and problem-oriented research is essential for achieving endogenous development and progress.

30. Governments, through national science policies and in acting as catalysts to facilitate interaction and communication between stakeholders, should give recognition to the key role of scientific research in the acquisition of knowledge, in the training of scientists and in the education of the public. Scientific research funded by the private sector has become a crucial factor for socio-economic development, but this cannot exclude the need for publicly funded research. Both sectors should work in close collaboration and in a complementary manner in the financing of scientific research for long-term goals.

2. Science for peace

31. The essence of scientific thinking is the ability to examine problems from different perspectives and seek explanations of natural and social phenomena, constantly submitted to critical analysis. Science thus relies on critical and free thinking, which is essential in a democratic world. The scientific community, sharing a long-standing tradition that transcends nations, religions or ethnicity, should promote, as stated in the Constitution of UNESCO, the “intellectual and moral solidarity of mankind”, which is the basis of a culture of peace. Worldwide cooperation among scientists is a valuable and constructive contribution to global security and to the development of peaceful interactions between different nations, societies and cultures, and could give encouragement to further steps in disarmament, including nuclear disarmament.

32. Governments and society at large should be aware of the need to use natural and social sciences and technology as tools to address the root causes and impacts of conflict. Investment in scientific research which addresses them should be increased.

3. Science for development

33. Today, more than ever, science and its applications are indispensable for development. Governments at all levels and the private sector should provide enhanced support for building up an adequate and well-shared scientific and technological capacity through appropriate education and research programmes as an indispensable foundation for economic, social, cultural and environmentally sound development. This is particularly urgent for developing countries. Technological development requires a solid scientific

basis and needs to be resolutely directed towards safe and clean production, greater efficiency in resource use and more environmentally friendly products. Science and technology should also be resolutely directed towards prospects for better employment, improving competitiveness and social justice. Investment in science and technology aimed both at these objectives and at a better understanding and safeguarding of the planet's natural resources base, biodiversity and life-support systems must be increased. The objective should be a move towards sustainable development strategies through the integration of economic, social, cultural and environmental dimensions.

34. Science education, in the broad sense, without discrimination and encompassing all levels and modalities is a fundamental prerequisite for democracy and for ensuring sustainable development. In recent years, worldwide measures have been undertaken to promote basic education for all. It is essential that the fundamental role played by women in the application of scientific development to food production and health care be fully recognized, and efforts made to strengthen their understanding of scientific advances in these areas. It is on this platform that science education, communication and popularization need to be built. Special attention is still required for marginalized groups**.** It is more than ever necessary to develop and expand science literacy in all cultures and sectors of society as well as reasoning ability and skills and an appreciation of ethical values, so as to improve public participation in decision-making related to the application of new knowledge. Progress in science makes the role of universities particularly important in the promotion and modernization of science teaching and its coordination at all levels of education. In all countries, and in particular the developing countries, there is a need to strengthen scientific research in higher education and postgraduate programmes, taking into account national priorities.

35. The building of scientific capacity should be supported by regional and international cooperation, to ensure both equitable development and the spread and utilization of human creativity without discrimination of any kind against countries, groups or individuals. Cooperation between developed and developing countries should be carried out in conformity with the principles of full and open access to information, equity and mutual benefit. In all efforts of cooperation, diversity of traditions and cultures should be given due consideration. There is a responsibility of the developed world to enhance partnership activities in science with developing countries and countries in transition. Helping to create a critical mass of national research in the sciences through regional and international cooperation is especially important for small States and least developed countries. The presence of scientific structures, such as universities, is an essential element for the training of personnel in their own country with a view to a subsequent career in that country. Through these and other efforts favourable conditions should be created that will tend to reduce or reverse the brain drain. However, any measures should not restrict the free circulation of scientists.

36. Progress in science requires various types of cooperation at and between the intergovernmental, governmental and non-governmental levels, such as: multilateral projects; research networks, including South-South networking; partnerships involving scientific communities of developed and developing countries to meet the needs of all countries and facilitate their progress; fellowships and grants and promotion of joint research; programmes to facilitate the exchange of knowledge; the development of internationally recognized scientific research centres, particularly in developing countries; international agreements for the joint promotion, evaluation and funding of

mega-projects and broad access to them; international panels for the scientific assessment of complex issues; and international arrangements for the promotion of postgraduate training. New initiatives are required for interdisciplinary collaboration. The international character of fundamental research should be strengthened by significantly increasing support for long-term research projects and for international collaborative projects, especially those of global interest. In this respect particular attention should be given to the need for continuity of support for research. Access to these facilities for scientists from developing countries should be actively supported and open to all on the basis of scientific merit. The use of information and communication technology, particularly through networking, is to be expanded as a means to promote the free flow of knowledge. At the same time, care must be taken to ensure that the use of these technologies does not lead to a denial or restriction of the richness of the various cultures and means of expression.

37. For all countries to respond to the objectives set out in this Declaration, in parallel with international approaches, in the first place national strategies and institutional arrangements and financing systems should be set up or revised to enhance the role of sciences in sustainable development within the new context. In particular they should include: a long-term national policy on science to be developed together with the major public and private actors; support to science education and scientific research; the development of cooperation between R&D institutions, universities and industry as part of national innovation systems; the creation and maintenance of national institutions for risk assessment and management, vulnerability reduction, safety and health; and incentives for investment, research and innovation. Parliaments and governments should be invited to provide a legal, institutional and economic basis for enhancing scientific and technological capacity in the public and private sectors and facilitate their interaction. Science decision-making and priority-setting should be made an integral part of the overall development planning and formulation of sustainable development strategies. In this context, the recent initiative by the major G-8 creditor countries to embark on the process of reducing the debt of certain developing countries will be conducive to a joint effort by the developing and developed countries towards establishing appropriate mechanisms for the funding of science in order to strengthen national and regional scientific and technological research systems.

38. Intellectual property rights need to be appropriately protected on a global basis, and access to data and information is essential for undertaking scientific work and for translating the results of scientific research into tangible benefits for society. Measures should be taken to enhance those relationships between the protection of intellectual property rights and the dissemination of scientific knowledge that are mutually supportive. There is a need to consider the scope, extent and application of intellectual property rights in relation to the equitable production, distribution and use of knowledge. There is also a need to further develop appropriate national legal frameworks to accommodate the specific requirements of developing countries and traditional knowledge, sources and products, to ensure their recognition and adequate protection on the basis of the informed consent of the customary or traditional owners of this knowledge.

4. Science in society and science for society

39. The practice of scientific research and the use of knowledge from that research should always aim at the welfare of humankind, including the reduction of poverty, be respectful of the dignity and rights of human beings, and of the global environment, and take fully into account our responsibility towards present and future generations. There should be a new commitment to these important principles by all parties concerned.

40. A free flow of information on all possible uses and consequences of new discoveries and newly developed technologies should be secured so that ethical issues can be debated in an appropriate way. Each country should establish suitable measures to address the ethics of the practice of science and of the use of scientific knowledge and its applications. These should include due process procedures for dealing with dissent and dissenters in a fair and responsive manner. The World Commission on the Ethics of Scientific Knowledge and Technology of UNESCO can provide a means of interaction in this respect.

41. All scientists should commit themselves to high ethical standards, and a code of ethics based on relevant norms enshrined in international human rights instruments should be established for scientific professions. The social responsibility of scientists requires that they maintain high standards of scientific integrity and quality control, share their knowledge, communicate with the public and educate the younger generation. Political authorities should respect such action by scientists. Science curricula should include science ethics, as well as training in history, philosophy and the cultural impact of science.

42. Equality in access to science is not only a social and ethical requirement for human development, but also a necessity for realizing the full potential of scientific communities worldwide and for orienting scientific progress towards meeting the needs of humankind. The difficulties encountered by women, constituting over half of the population in the world, in entering, pursuing and advancing in a career in the sciences and in participating in decision-making in science and technology should be addressed urgently. There is an equally urgent need to address the difficulties faced by disadvantaged groups which preclude their full and effective participation.

43. Governments and scientists of the world should address the complex problems of poor health and the increasing inequalities in health across different countries and between communities within the same country with the objective of achieving an enhanced, equitable standard of health and an improved provision of quality health care for all. This should be undertaken through education, by using scientific and technological advances, by developing robust long-term partnerships between all stakeholders and by harnessing programmes to the task.

44. We, participants in the World Conference on “Science for the Twenty-first Century: A New Commitment”, commit ourselves to making every effort to realize the possibility of promoting dialogue between the scientific community and society to remove all discrimination with respect to education for and the benefits of science, to act ethically and cooperatively within our own spheres of responsibility, to strengthen scientific culture and its peaceful application throughout the world, and to promote the use of

scientific knowledge for the well-being of populations and for sustainable peace and development, taking into account the social and ethical principles illustrated above.

45. We consider that the Conference document *Science Agenda - Framework for Action* gives practical expression to a new commitment to science, and can serve as a strategic guide for partnership within the United Nations system and between all stakeholders in the scientific endeavour in the years to come.

46. We adopt therefore this *Declaration on Science and the Use of Scientific Knowledge* and agree upon the *Science Agenda - Framework for Action* as a means of achieving the goals set forth in the Declaration, and call upon UNESCO and ICSU to submit both documents to the General Conference and the General Assembly respectively. These documents will also be seized by the United Nations General Assembly. The purpose is to enable both organizations to identify and implement follow-up action in their respective programmes, and to mobilize the support of all partners, particularly those in the United Nations system, in order to reinforce international coordination and cooperation in science.

ANNEX II

INTRODUCTORY NOTE TO THE SCIENCE AGENDA - FRAMEWORK FOR ACTION

The present document, prepared by the World Conference on Science Secretariat, was aimed at facilitating the understanding of the draft *Science Agenda - Framework for Action*, and is retained here for the same purpose. This text is not presented for endorsement.

THE NEW CONTEXT

1. Several major factors have transformed, and will continue to affect, the relationships between science and society as they have developed in the second half of the century.

(a) Scientific research is increasing our knowledge and ability to understand complex systems and processes in an ever-wider range of scales in space and time. The natural sciences are enjoying a highly creative phase stemming from breakthroughs and advances in various fields, from molecular biology and biochemistry, quantum physics and material science to the planetary sciences and astronomy. The emergence of new disciplines and of interactions among them, increasingly powerful computational tools, the rapid accumulation of scientific knowledge, and the need to bring together the natural and the social sciences in joint agendas, are having strong implications on scientific research and education.

(b) The conditions for the production and sharing of scientific knowledge are themselves changing as a consequence of the increasing intensity of communication, the growing interface between disciplines and tighter interactions between science and technology, universities and industry, laboratories and factories. Major economic and social implications are arising from the closer contacts between scientific discoveries and their application, technological know-how and commercial exploitation. Information and communication technologies are causing changes on all fronts as profound as those brought about when print first appeared.

(c) Linked to the changes occurring in science and technology are the globalization of trade and business, the growing role of transnational firms, and a reduction in the capacities of governments to regulate economic activity and its repercussions on society. Within a framework that is increasingly subject to transnational challenges and short-term requirements, competitive businesses are often those that can capture information flows and apply them quickly, rather than produce discoveries and inventions themselves.

(d) The end of the Cold War has resulted in a significant reorientation of investment in science and technology in some countries. For the most industrialized ones, resources dedicated to defence research during this period had represented a major part of public R&D expenditure. Unfortunately, in recent years, the percentage of GNP devoted to international cooperation, particularly with developing countries, has - with certain exceptions - stagnated or decreased. Taken together with economic difficulties, the result has been little or no growth worldwide in non-business funding for fundamental research, whilst business R&D has declined in some sectors as a natural consequence of the stagnation of the global economy.

At the same time, research programmes, especially large ones designed to address global problems, are subject to increasing costs.

(e) Growing inequalities on all fronts that contribute to new tensions and conflicts today beset the world. The patterns of disparities are now more complex and more contrasted. As one of many instances that illustrate this situation on a global scale, we recall that 20 per cent of humankind share 86 per cent of the total private consumption. Within and between countries the benefits of education, culture, health services and other factors of human and social well-being are ever more unequally distributed. On the whole, while the industrially more developed nations have built up a strong capacity for scientific research and technological innovation, other countries - the majority - have yet to solve basic needs of their populations, and the least developed countries are struggling for survival. The varying degrees to which countries and regions adapt to the scientific and technological changes threaten to further accentuate inequalities in access to and production of scientific knowledge and technical know-how.

(f) A further major factor is the multiplication of the environmental problems that weigh on the future of our planet. Beyond the phenomena of population growth and increasing urbanization, industrial, agricultural and transport activities are bringing about a major transformation of the global environment with serious consequences for human health and the productivity of ecosystems. Human action has even started to affect the functioning of global life support systems such as the climate system. The need to adopt the precautionary principle, initiate anticipatory research, take preventive action, and indeed make sustainability an essential ingredient in any model of development has become more evident at a time when societies, cultures, economies and environments are becoming increasingly interdependent.

(g) The need to take into account ethical consequences when discussing future directions of science has become more urgent over the last few years, requiring an open debate within the scientific community and in society at large. In this context, scientists themselves have started to play an active role in defining and accepting their ethical responsibilities. Public understanding and awareness of science are important factors in the establishment of appropriate ethical guidelines and procedures.

(h) A feature of our times is the emergence of organized sectors of society demanding participation in democratic debates and decision-making, as well as transparency on all public issues. Alongside traditional actors, such as trade unions and political parties, strong new groups are coming to the fore, including the communication media, citizen movements, and a variety of non-governmental organizations, such as associations of parliamentarians, industrial professions and entrepreneurs. Many of these are concerned with the environmental and other issues that the sciences are expected to address. Some reflect a lay disenchantment and disregard for science, and a fear of the unforeseen or unknown consequences of some of its applications. The confusion about who speaks for science amongst the many sectors, and whose science can be trusted, adds to this public mistrust.

(i) Women as a majority of the world population are claiming an increased role in all activities, particularly in science and technology. Important institutional and cultural barriers that prevent the progress of women in science education and research and their taking on responsibilities on a par with men, need still to be removed. Achieving a better gender balance in scientific activities, itself being a strong desideratum for reasons of equity, also implies that the approach, and even the content, of scientific advances may change to focus more on the needs and aspirations of humankind.

2. There is today an accumulation of discoveries, applications and know-how that constitute an unprecedented source of knowledge, information and power. Never have discoveries and innovations promised a greater increase in material progress than today, but neither has the productive - or destructive - capacity of humankind left unresolved so many uncertainties. The major challenge of the coming century lies in the ground between the power which humankind has at its disposal and the wisdom which it is capable of showing in using it.

3. Guided by the conviction that it is both urgent and possible to take up this challenge, the participants to the Conference are determined to concentrate efforts on the production and sharing of knowledge, know-how and techniques to address the major problems ahead - whether local, regional or global. It is evident to everyone today, however, that it is not science alone that will solve the problems. A new relationship needs to be built between those who create and use scientific knowledge, those who support and finance it, and those concerned with its applications and impacts; such are the essence and the spirit of the new commitment.

4. In considering the practical expressions of this commitment, it must be recognized that the relationship between scientific research, education, technological innovation and practical benefits is much more diverse and complex today than in the past, and frequently involves many players other than researchers. The progress of science cannot be justified purely in terms of search for knowledge. In addition, it must be defended - and increasingly so, in view of budgetary restrictions - through its relevance and effectiveness in addressing the needs and expectations of our societies.

5. Democratic decision-making on scientific matters requires participation of all groups of society. It also needs consideration and respect for national diversity, within a spirit of solidarity and cooperation. If only one sector of the population or a single group of nations has an active role in science and its applications, disequilibria are likely to occur, and the gaps and disparities tend to increase. Therefore, in defining and carrying out the multilateral commitment to science it is not only important that each and every country be able to make its own informed and articulate contribution, but also that all actors - the public, the media, scientists, educators, industrialists, politicians and decision-makers - be involved in the process.

THE NEW COMMITMENT

6. In the process leading to the *World Conference on Science* and to the drafting of the *Declaration on Science and the Use of Scientific Knowledge* and the *Science Agenda - Framework for Action*, numerous reflections and enlightening debates have taken

place. Among the wide variety of concerns and proposals expressed, there are clear signals of convergence with regard to some central issues. These are listed here as general guidelines to facilitate the identification of the new commitment.

(a) Need for drastic changes of attitude and approach to problems of development, especially to their social, human and environmental dimension. The sciences must be put to work for sustainable peace and development in a progressively responsive and democratic framework; scientists, as all other stakeholders, must correspondingly recognize their ethical, social and political responsibilities.

(b) Need to improve, strengthen and diversify science education, formal and non-formal, at all levels and for all sectors, and to integrate science into the general culture, emphasizing its contribution to the formation of open and critical thinking as well as to the improvement of people's ability to meet the challenges of modern society. Any discriminatory barrier operating against equitable participation in science must be removed, and positive efforts are needed to fully integrate women into the sciences.

(c) Need to strengthen the national S&T base, refurbishing national science policies, increasing scientific personnel and ensuring a stable and supportive research context, especially in areas of local and global relevance. In developing countries increased funding for S&T is needed, taking into account local capacities and priorities, and this funding should be augmented by similar commitments from developed partners.

(d) Need to break traditional barriers between the natural and the social sciences and to adopt interdisciplinarity as a common practice. Moreover, since the processes underlying present global problems and challenges need the concurrence of all scientific disciplines, it is imperative to attain a proper balance in their support.

(e) Need to open scientific matters to public debate and democratic participation, so as to arrive at consensus and concerted action. The scientific community is expected to open itself to a permanent dialogue with society. A dialogue with other forms of knowledge and expressions of culture is particularly relevant.

(f) Need to reinforce and broaden scientific cooperation, regional and international, through networking and institutional arrangements with IGOs, NGOs, research and education centres. In this regard, the programmes of UNESCO and ICSU must be strengthened, in particular through cooperation between them and with other United Nations bodies. It is a challenge to improve the coordination of the various efforts of these partners, respecting their different roles and stimulating synergy between them.

BASIS FOR ACTION

The following text takes up all sections of the draft *Science Agenda - Framework for Action* and attempts to provide the general ideas behind the guidelines for action listed therein.

1. SCIENCE FOR KNOWLEDGE; KNOWLEDGE FOR PROGRESS

1.1 Role of fundamental research

7. The sciences are expected to continue to fulfil their intrinsic assignment which is the acquisition of knowledge and understanding, benefiting from the creativity of scientists around the world. This is the central argument for continuing to carry out fundamental research and education in all disciplines of the sciences.

8. Public authorities, private companies, universities, research laboratories and institutes each have their own dynamics and domains of action. In being associated with all such different partners, scientific research must cope with the underlying diversity of contexts and adopt a coherent agenda, establishing a balance between immediate and long-term objectives.

9. In designing international policies and programmes for science, the multiplicity of conditions for scientific research, of perceptions of science, and also of problems, needs and possibilities to apply scientific knowledge must be borne in mind. International science is ideally built upon the plurality and diversity of contributions that all nations can make to the scientific endeavour, in regard to their own capacities, needs and interests.

1.2 The public and private sectors

10. Fundamental research requires sustained public support, as it represents an “off-market” public asset with uncertain short-term profitability. The returns and applications deriving from it provide, in turn, new irrigation for the entire research system, while at the same time contributing to the solution of specific problems and the development of technological competences.

11. New funding mechanisms must be sought for science, taking into account the present context. In most industrialized countries private investment in S&T research surpasses that financed by the public sector, and a number of public institutions have been or are being privatized. Agencies awarding grants tend to give preference to research with short-term goals, and accountability of results is increasingly based on technological applications and patents rather than on basic knowledge acquisition. In the majority of developing countries, on the other hand, most of scientific research is publicly financed. Even in those countries that have managed to build up a critical mass of scientists, the private sector gives preference to research with short-term goals or does not invest in research at all; the scientific system is weakly linked to the productive system and local industry does not benefit from the opportunities created by science; as a result, S&T contributes little to the creation of national wealth in these countries.

1.3 Sharing scientific information and knowledge

12. The new communication and information technologies have become an important factor of change, giving rise to new directions, methodologies and scenarios for scientific work and new ways of producing, accessing and using information. The growing impact and potential of the new technologies make it necessary for scientists and institutions to adapt themselves in order to fully benefit from the advantages they can bring. In this regard it is essential that they be developed and used to provide equal opportunities for scientists in different regions of the world, to facilitate the wide distribution and access of information, and to promote a truly international scientific dialogue. Computing and information systems that are reflective of the

diverse cultures, languages, technical resources, habits and needs of people around the world, need to be designed.

13. True and comprehensive sharing of scientific knowledge cannot be accomplished by electronic means alone. Regional and international networks for research and training, partnerships involving communities of developed and developing countries, and specific programmes for the exchange and transfer of scientific knowledge and skills, have proved to be important mechanisms and should be fostered and implemented more widely.

2. SCIENCE FOR PEACE AND DEVELOPMENT

2.1 Science for basic human needs

14. Food, water, shelter, access to health care, social security and education are cornerstones of human well-being. Poverty and dependence affecting a number of countries can only be escaped through social and economic transformation and political determination, a comprehensive and upgraded education system, and the appropriate development and use of science and technology. Scientific knowledge needs to be applied to find ways of reducing the imbalance, injustice and lack of resources that particularly affect the marginalized sectors of society and the poorer countries in the world.

15. Science is today a currency in the hierarchy of nations. Developing countries need to enhance S&T capacities in areas that are relevant to the problems of their own populations and to their national development. It should not be overlooked, however, that these countries present a very mixed profile, some being in various ways closer to the industrialized world than to their fellow countries. It is essential that each country has the capacity and takes on the responsibility to define its priorities and areas of relevance and how to address them.

16. It is against this background that a case for supporting S&T in developing countries is made. Such an effort will benefit these countries in solving their actual problems and achieving more healthy and sustained development. In essence, it will be of global benefit, since there are more than 120 developing countries, comprising three fourths of the global population. As long as these countries are not effectively involved in science, can we talk of "world science"?

17. There is need for urgency here. Comprehensive, far-reaching and lasting development is a universal challenge and is not restricted to a particular group of countries. It requires coherent, plural, multifaceted action, to which the international community has much to contribute.

2.2 Science, environment and sustainable development

18. One of the greatest challenges facing the world community in the next century will be the attainment of sustainable development, calling for balanced interrelated policies aimed at economic growth, poverty reduction, human well-being, social equity and the protection of the Earth's resources, commons and life-support systems. It is increasingly perceived that sustainable management and use of resources and sustainable production and consumption patterns in general, are the only pathways to meeting developmental and environmental needs of present and future generations. We must enhance and harness our scientific capabilities to develop sustainably.

19. Taking into account the “Programme for the Further Implementation of Agenda 21” adopted by the United Nations General Assembly in 1997, the guidelines for action provided in the Agenda are expected to address the following key objectives: to strengthen capacity and capability in science for sustainable development, with particular emphasis on the needs of developing countries; to reduce scientific uncertainty and improve the long-term prediction capacity for the prudent management of environment-development interactions; to foster international scientific cooperation and the transfer and sharing of scientific knowledge; to bridge the gap between science, the productive sectors, decision-makers and major groups in order to broaden and strengthen the application of science.

2.3 Science and technology

20. Science, technology and engineering are among the principal drivers of industrial and economic development. The difference in abilities of countries to exploit S&T through the process of innovation contributes to an ever-increasing extent to differences in economic performance and to the widening income gap between industrialized and developing countries.

21. Innovation in all sectors is increasingly characterized by bidirectional feedback between the basic research system, and technology development and diffusion. This is changing the requirements for successful technology transfer and upgrading of innovation capabilities in the developing countries, with implications for domestic policies and international cooperation. One of their main priorities must now be to promote the development of national scientific and technological infrastructures and of the corresponding human resources.

2.4 Science education

22. There is an urgent need to renew, expand and diversify basic science education for all, with emphasis on scientific and technological knowledge and skills needed to participate meaningfully in the society of the future. The rapid advancement of scientific knowledge means that the established education system cannot alone cope with the changing needs of the population at the various levels; increasingly, formal education must be complemented through non-formal channels. The communication media and technologies can play an important role in this regard. On a broader scale, an increasingly scientifically oriented society needs science popularization in its widest sense, to promote an improved understanding of science and adequately orient public perceptions and attitudes about science and its applications.

23. It is today widely recognized that without adequate higher S&T education and research institutions providing a critical mass of skilled scientists, no country can ensure genuine development. It is further agreed that action at national level should aim to tighten the links between higher education and research institutions, taking into account that education and research are closely related elements in the establishment of knowledge.

2.5 Science for peace and conflict resolution

24. There can be no lasting peace as long as essential problems of development are not properly attended to; there can be no proper development as long as the culture and the practice of peace are not universally adopted. Were science always geared towards peaceful purposes, it certainly would make a greater contribution to the well-being of humankind.

25. Constructing the defences of peace in the minds of individuals, as recommended in the Preamble of UNESCO's Constitution, implies grasping the tools of scientific knowledge to reveal, understand and at the same time prevent the root causes of conflict. This field of research requires the concerted effort of a large number of scientific disciplines, involving as it does issues such as social inequality, poverty, food provision, justice and democracy, education for all, health care and environmental degradation. In other words, it involves every aspect of economic, social or political life that engenders violence.

26. The contribution to the construction of the defences of peace entails a great responsibility for all professionals active in science and technology. The principles of universality, freedom and critical thinking that are dear to science, constitute a common bond for a constructive dialogue between parts in conflict and serve to fight intolerance and ideological and social barriers. Scientists have demonstrated the role that they can play in addressing conflicts and preparing peaceful agreements; this role must continue, with the support of governments and independent institutions.

2.6 Science and policy

27. Each country needs to have the capacity to design and implement its own science policy with responsibility within the global context, and to confront the dilemmas of priorities and competition for resources from the particular phase of economic development and industrialization in which it finds itself. A balanced development of a science base suitable for the country's needs requires an elaborate infrastructure and a stable institutional support, as well as the existence of an appropriate legal and regulatory framework. Regional and international networking and cooperation can facilitate the exchange of national experiences and the design of more coherent science policies. Requiring special attention are the legal issues and regulations guiding international research and development in strategic areas such as information and communication technologies, biodiversity and biotechnology. Cooperation among international organizations is needed, to improve the measurement and understanding of intangible assets and recognition of their importance and to protect the output of intangible investments in areas such as intellectual property rights. An internationally accepted framework should provide for the protection of intellectual property rights, recognizing the provisions in existing frameworks that allow for different approaches.

28. In view of the increasing complexity of decision-making in the contemporary world, scientists should be more proactive in their contribution to national policy-making. The role of science in society and governance has never been more important. Science has an overriding responsibility to help societies make a transition to a dynamically stable and sustainable ecological and economic system. In this transition, an alliance between modern technical science and the holistic wisdom from traditional societies and philosophers from all cultures can be very important.

3. SCIENCE IN SOCIETY AND SCIENCE FOR SOCIETY

3.1 Social requirements and human dignity

29. Science should be at the service of humanity as a whole, and contribute to improving the quality of life for every member of present and future generations. Those fields that promise to address issues of social interest need therefore to be high on the agenda. When dealing with science-society benefits, long-term vision in scientific planning is necessary, provided that

intermediate objectives are defined so that appropriate evaluation can be undertaken. Different individuals, sectors or groups can have widely varying needs and requirements, according to parameters such as: age, education, health, professional training, working place, living place, economic status, gender and cultural background. Identifying these diverse needs, and finding possible ways to address and fulfil them, require the concerted effort of scientists from different disciplines. The new reciprocal commitment between science and society will require not only that the scientific community take account of these challenges, but also that the cooperation mechanisms be resolute in promoting a strategy to meet them.

30. The scientific community, governments, and all relevant institutions are urged to commit themselves to unrestricted respect for social and human dignity. In compliance with an essential social and moral duty, scientists should always work for the democratic principles of dignity, equality and respect of individuals and against ignorance, prejudice and the exploitation of human beings.

3.2 Ethical issues

31. The new discoveries and applications of science, while raising enormous hopes and expectations, also give rise to a variety of ethical problems; scientists, therefore, can no longer overlook the ethical implications of scientific work. Ethics is a subject for permanent debate, choices and commitments - at both the individual and the social level - that transcends juridical prescriptions and adapts itself to a diversity of evolving situations.

32. The full and free exercise of science, with its own values, should not be seen to conflict with the recognition of spiritual, cultural, philosophical and religious values; an open dialogue needs to be maintained with these value systems to facilitate mutual understanding. For the development of an all-encompassing debate on ethics in science, and a possibly ensuing code of universal values, it is necessary to recognize the many ethical frameworks in the civilizations around the world.

3.3 Widening participation in science

33. All human beings have the right to participate in the scientific enterprise. Equity in entering and pursuing a career in science is one of the social and ethical requirements of human development; there should be no discrimination in science, against any sector or individual. The increasing participation or involvement of all sectors of society in the scientific enterprise entails a systemic revision of science; it is clear that the decision-making and normative mechanisms of the institution of science are inevitably affected. In particular, any kind of central monitoring, whether political, ethical or economic, needs to take into account the increasingly diverse actors entering into the social tissue of science.

34. Women’s participation in the planning, orientation, and assessment of scientific research and education activities needs urgently to be increased, in order to benefit from their perspective on science and their contribution to it; only in this way can maximum use be made of the intellectual potential of humankind as a whole and the optimal contribution to human and social well-being ensured.

3.4 Modern science and other systems of knowledge

35. Modern science does not constitute the only form of knowledge, and closer links need to be established between this and other forms, systems and approaches to knowledge, for their

mutual enrichment and benefit. A constructive intercultural debate is in order, to help find ways of better linking modern science to the broader knowledge heritage of humankind.

36. Traditional societies, many of them with strong cultural roots, have nurtured and refined systems of knowledge of their own, relating to such diverse domains as astronomy, meteorology, geology, ecology, botany, agriculture, physiology, psychology and health. Such knowledge systems represent an enormous wealth. Not only do they harbour information as yet unknown to modern science, but they are also expressions of other ways of living in the world, other relationships between society and nature, and other approaches to the acquisition and construction of knowledge. Special action must be taken to conserve and cultivate this fragile and diverse world heritage in the face of globalization and the growing dominance of a single view of the natural world as espoused by science. A closer linkage between science and other knowledge systems is expected to bring important advantages to both sides.

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List of related conferences

The *Declaration on Science and the Use of Scientific Knowledge* and the *Science Agenda - Framework for Action* have taken into account the decisions, recommendations and reports of a number of recent major intergovernmental or non-governmental conferences, listed below, as well as the reports of associated meetings organized within the framework of the World Conference on Science.

Recommendation on the Status of the Scientific Researchers, adopted by the UNESCO General Conference, Paris, 1974

Vienna Programme of Action on Science and Technology for Development (UNCSTD), United Nations, New York, 1979

ICSU/ICASE/UNESCO International Conference on Science Education, Bangalore, 1985

ICSU Statement on Freedom in the Conduct of Science, Paris, 1989

World Conference on Education for All: Meeting Basic Learning Needs (Final Report), Jomtien, 1990

WMO/UNEP/UNESCO/ICSU Second World Climate Conference, Geneva, 1990

Statement of the International Conference on an Agenda of Science for Environment and Development into the 21st Century (ASCEND 21), Vienna, 1991

Agenda 21 of the United Nations Conference on Environment and Development, Rio de Janeiro, 1992

Conference on Academic Freedom and University Autonomy, Sinaia, 1992

ICSU Statement on Gene Patenting, Paris, 1992

World Conference on Human Rights, Vienna, 1993

Report of the Global Conference on the Sustainable Development of Small Island Developing States, Bridgetown, Barbados, 1994

Agenda for Development adopted by the Group of 77 in New York, 18 April 1995

International Conference on Donor Support to Development-Oriented Research in Basic Sciences, Uppsala, 1995

World Summit for Social Development, Copenhagen, Denmark, 1995

Report of the Gender Working Group on Gender Implications of Science and Technology for the Benefit of Developing Countries of the United Nations Commission on Science and Technology, 1995

Fourth World Conference on Women, Beijing, 1995

International Congress on Education and Informatics, Moscow, 1996

ICSU Statement on Animal Research, Paris, 1996

World Food Summit, Rome, 1996

Programme for the Further Implementation of Agenda 21, United Nations General Assembly, New York, 1997

World Congress on Higher Education and Human Resources Development for the Twenty-First Century, Manila, 1997

Universal Declaration on the Human Genome and Human Rights, adopted by the UNESCO General Conference, Paris, 1997

World Declaration on Higher Education for the Twenty-First Century: Vision and Action, UNESCO, Paris, 1998

Framework for Priority Action for Change and Development of Higher Education, UNESCO, Paris, 1998.

ANNEX III

SCIENCE AGENDA - FRAMEWORK FOR ACTION

PREAMBLE

1. We, participants in the *World Conference on Science for the Twenty-First Century: A New Commitment,* assembled in Budapest, Hungary, from 26 June to 1 July 1999 under the aegis of the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the International Council for Science (ICSU), state the following:

2. Advancing the objectives of international peace and the common welfare of humankind is one of the highest and most noble goals of our societies. The creation of UNESCO and of ICSU, more than half a century ago, was a symbol of the international determination to advance these objectives through scientific, educational and cultural relations among the peoples of the world.

3. The above objectives are as valid now as they were 50 years ago. However, while the means of achieving them have been greatly improved over this half-century through scientific and technological progress, so have the means of threatening and compromising them. In the meantime, the political, economic, social, cultural and environmental context has also changed profoundly, and the role of the sciences (natural sciences such as physical, earth and biological sciences, biomedical and engineering sciences, social and human sciences) in this changed context needs to be collectively defined and pursued: hence the grounds for a new commitment.

   Having adopted the *Declaration on Science and the Use of Scientific Knowledge,* and having taken inspiration from the *Introductory Note to the Science Agenda - Framework for Action,*

4. *We agree, by common consent, to the present* ***Science Agenda - Framework for Action,*** *as guidelines and instruments for action to achieve the goals proclaimed in the Declaration.*

5. We consider that the guidelines for action formulated hereafter provide a framework for dealing with the problems, challenges and opportunities confronting scientific research and for the furthering of existing and new partnerships, both national and international, between all actors in the scientific endeavour. Such research efforts and partnerships must be consistent with the needs, aspirations and values of humankind and respect for nature and future generations, in the pursuit of lasting peace**,** equity and sustainable development.

1. SCIENCE FOR KNOWLEDGE; KNOWLEDGE FOR PROGRESS

6. We commit ourselves to the advancement of knowledge. We want this knowledge to be at the service of humanity as a whole, and to produce a better quality of life for present and future generations.

1.1 Role of fundamental research

7. Each country should aim at having high-quality scientific institutions capable of providing research and training facilities in areas of specific interest. In those cases where countries are unable to create such institutions, the necessary support should be granted by the international community, through partnership and cooperation.

8. The conduct of scientific research should be supported by an appropriate legal framework at the national and international level. Freedom of opinion and protection of intellectual rights are particularly important in this respect.

9. Research groups and institutions and relevant non-governmental organizations should strengthen their regional and international cooperation activities, with a view to: facilitating scientific training; sharing expensive facilities; promoting the dissemination of scientific information; exchanging scientific knowledge and data, notably between developed and developing countries; and jointly addressing problems of global concern.

10. Universities should ensure that their programmes in all fields of science focus on both education and research and the synergies between them and introduce research as part of science education. Communication skills and exposure to social sciences should also be a part of the education of scientists.

11. In the new context of increased globalization and international networking the universities are faced not only with new opportunities but also with challenges. For example, universities play an increasingly important role in the innovation system. Universities are responsible for educating the highly skilled workforce for the future and equipping their students with the capabilities needed to deal with global issues. They should also be flexible and regularly update their knowledge. Universities in developed and developing countries should intensify their cooperation, for example through twinning arrangements. UNESCO could act as a clearing house and facilitator.

12. Donor countries and agencies of the United Nations system are urged to foster cooperation in order to increase the quality and efficiency of their support to research in developing countries. Their joint effort should be focused on strengthening national research systems, taking into account national priorities and science policies.

13. Professional organizations of scientists, such as national and international academies, scientific unions and learned societies, have an important role to play in the promotion of research, for which they should be given wide recognition and corresponding public support. Such organizations should be encouraged to further international collaboration on questions of universal concern. They should also be encouraged to be the advocates of the freedom of scientists to express their opinions.

1.2 The public and private sectors

14. Through participatory mechanisms involving all relevant sectors and stakeholders**,** governments should identify the needs of the nation and give priority to support of the public research needed to achieve progress in the various fields, ensuring stable funding for the purpose. Parliaments should adopt corresponding measures and levels of budget appropriation.

15. Governments and the private sector should achieve an adequate balance between the various mechanisms for funding of scientific research, and new funding possibilities should be explored or promoted through appropriate regulation and incentive schemes, with public-private partnerships based on flexible schemes, and governments warranting the accessibility of generated knowledge.

16. A close dialogue should exist between donors and recipients of S&T funding. Universities, research institutes and industry should develop closer cooperation; financing of S&T projects should be promoted as a means of advancing knowledge and strengthening science-based industry.

1.3 Sharing scientific information and knowledge

17. Scientists, research institutions and learned scientific societies and other relevant non-governmental organizations should commit themselves to increased international collaboration including exchange of knowledge and expertise. Initiatives to facilitate access to scientific information sources by scientists and institutions in the developing countries should be especially encouraged and supported. Initiatives to fully incorporate women scientists and other disadvantaged groups from the South and North into scientific networks should be implemented. In this context efforts should be made to ensure that results of publicly funded research will be made accessible.

18. Countries that have the necessary expertise should promote the sharing and transfer of knowledge, in particular through support to specific programmes set up for the training of scientists worldwide.

19. The publication and wider dissemination of the results of scientific research carried out in the developing countries should be facilitated, with the support of developed countries, through training, exchange of information and the development of bibliographic services and information systems better serving the needs of scientific communities around the world.

20. Research and education institutions should take account of the new information and communication technologies, assess their impact and promote their use, for example through the development of electronic publishing and the establishment of virtual research and teaching environments or digital libraries. Science curricula should be adapted to take into account the impact of these new technologies on scientific work. The establishment of an international programme on Internet-enabled science and vocational education and teaching, together with the conventional system, should be considered to redress the limitations of educational infrastructure and to bring high-quality science education to remote locations.

21. The research community should be involved in regular discussion with the publishing, library and information technology communities to ensure that the authenticity and integrity of scientific literature are not lost in the evolution of the electronic information system. The dissemination and sharing of scientific knowledge are an essential part of the research process, and governments and funding agencies should therefore ensure that relevant infrastructure and other costs are adequately covered in research budgets. Appropriate legal frameworks are necessary as well.

2. SCIENCE FOR PEACE AND DEVELOPMENT

22. Today, more than ever, the natural and social sciences and their applications are indispensable to development. Worldwide cooperation among scientists is a valuable and constructive contribution to global security and to the development of peaceful interactions among different nations, societies and cultures.

2.1 Science for basic human needs

23. Research specifically aimed at addressing the basic needs of the population should be a permanent chapter in every country's development agenda. In defining research priorities, the developing countries and countries in transition should consider not only their needs and weaknesses in terms of scientific capacity and information, but also their own strengths in terms of local knowledge, know-how and human and natural resources.

24. For a country to have the capacity to provide for the basic needs of its population, science and technology education is a strategic necessity. As part of this education, students should learn to solve specific problems and to address the needs of society by utilizing scientific and technological knowledge and skills.

25. Industrialized countries should cooperate with developing countries through jointly defined S&T projects that respond to the basic problems of the population in the latter. Careful impact studies should be conducted to ensure better planning and implementation of development projects. Personnel engaged in such projects should receive training of relevance to their activity.

26. All countries should share scientific knowledge and cooperate to reduce avoidable ill-health throughout the world. Each country should assess and so identify the health improvement priorities that are best suited to their own circumstances. National and regional research programmes aimed at reducing variations in health among communities, such as collecting good epidemiological and other statistical data and communicating corresponding best practice to those who can use it, should be introduced.

27. Innovative and cost-effective mechanisms for funding science and pooling S&T resources and efforts of different nations should be examined for implementation by relevant institutions at the regional and international levels. Networks for human resources interchange, both North-South and South-South, should be set up. These networks should be so designed as to encourage scientists to contribute their expertise to their own countries.

28. Donor countries, non-governmental and intergovernmental organizations and United Nations agencies should strengthen their programmes involving science to address pressing developmental problems as elaborated in the Science Agenda while maintaining high quality standards.

2.2 Science, environment and sustainable development

29. National, regional and global environmental research programmes should be strengthened or developed, as appropriate, by governments, concerned United Nations agencies, the scientific community and private and public research funding institutions.

These research programmes should include programmes for capacity-building. Areas requiring special attention include the freshwater issue and the hydrological cycle, climate variations and change, oceans, coastal areas, polar regions**,** biodiversity, desertification, deforestation, biogeochemical cycles and natural hazards. The goals of the existing international global environmental research programmes should be vigorously pursued within the framework of Agenda 21 and the action plans of the global conferences. Cooperation between neighbouring countries or among countries having similar ecological conditions must be supported in the solution of common environmental problems.

30. All components of the earth system must be monitored systematically on a long-term basis; this requires enhanced support by governments and the private sector for the further development of the global environmental observing systems. The effectiveness of monitoring programmes depends crucially on the wide availability of monitored data.

31. Interdisciplinary research between natural and social sciences must be vigorously enhanced by all major actors concerned, including the private sector, to address the human dimension of global environmental change including health impacts, and to improve understanding of sustainability as conditioned by natural systems. Insights into the concept of sustainable consumption also demand interaction of natural sciences with social and political scientists, economists and demographers.

32. Modern scientific knowledge and traditional knowledge should be brought closer together in interdisciplinary projects dealing with the links between culture, environment and development in such areas as the conservation of biological diversity, management of natural resources, understanding of natural hazards and mitigation of their impact. Local communities and other relevant players should be involved in these projects. Individual scientists and the scientific community have the responsibility to communicate in popular language the scientific explanations of these issues and the ways in which science can play a key role in addressing them.

33. Governments, in co-operation with universities and higher education institutions, and with the help of relevant United Nations organizations, should extend and improve education, training and facilities for human resources development in environment-related sciences, utilizing also traditional and local knowledge. Special efforts in this respect are required in developing countries with the cooperation of the international community.

34. All countries should emphasize capacity-building in vulnerability and risk assessment, early warning of both short-lived natural disasters and long-term hazards of environmental change, improved preparedness, adaptation, mitigation of their effects and integration of disaster management into national development planning. It is important, however, to bear in mind that we live in a complex world with an inherent uncertainty about long-term trends. Decision-makers must take this into account and therefore encourage the development of new forecasting and monitoring strategies. The precautionary principle is an important guiding principle in handling inevitable scientific uncertainty, especially in situations of potentially irreversible or catastrophic impacts.

35. S&T research on clean and sustainable technologies, recycling, renewable energy resources and efficient use of energy should be strongly supported by the public and private sectors at national and international levels. Competent international organizations, including UNESCO and UNIDO, should promote the establishment of a freely accessible virtual library on sustainable technologies.

2.3 Science and technology

36. National authorities and the private sector should support university-industry partnerships involving also research institutes and medium, small and micro-enterprises, for promoting innovation, accelerating returns from science and generating benefits for all the participants.

37. Curricula relating to science and technology should encourage a scientific approach to problem-solving. University-industry cooperation should be promoted to assist engineering education and continuing vocational education and to enhance responsiveness to the needs of industry and support from industry to the education sector.

38. Countries should adopt best practices for advancing innovation, in a manner best suited to their needs and resources. Innovation is no longer a linear process arising from a single advance in science; it requires a systems approach involving partnerships, linkages between many areas of knowledge and constant feedback between many players. Possible initiatives include cooperative research centres and research networks, technology “incubators” and research parks, and transfer and advisory bodies for small and medium enterprises. Specific policy instruments, including initiatives to encourage national innovation systems to address science-technology links, should be developed taking into account global economic and technological changes. Science policy should promote the incorporation of knowledge into social and productive activities. It is imperative to tackle the issue of endogenous generation of technologies starting from problems that pertain to developing countries. This implies that these countries should have resources available to become generators of technologies.

39. Acceleration of technology transfer to promote industrial, economic and social development should be supported through the mobility of professionals between universities and industry and between countries as well as through research networks and inter-firm partnerships.

40. Greater emphasis should be placed by governments and institutions of higher learning on engineering, technological and vocational education, also in the form of lifelong learning and through the means of international cooperation. New curriculum profiles which are consistent with the requirements of employers and attractive to youth should be defined. In order to mitigate the adverse impact of asymmetric migration of trained personnel from the developing to the developed countries and also to sustain high-quality education and research in developing countries, UNESCO may catalyse more symmetric and closer interaction of S&T personnel across the world and the establishment of world-class education and research infrastructure in the developing countries.

2.4 Science education

41. Governments should accord highest priority to improving science education at all levels, with particular attention to the elimination of the effects of gender bias and bias against disadvantaged groups, raising public awareness of science and fostering its popularization. Steps need to be taken to promote the professional development of teachers and educators in the face of change and special efforts should be made to address the lack of appropriately prepared science teachers and educators, in particular in developing countries.

42. Science teachers at all levels and personnel involved in informal science education should have access to continuous updating of their knowledge for the best possible performance of their educational tasks.

43. New curricula, teaching methodologies and resources, taking into account gender and cultural diversity, should be developed by national education systems in response to changing educational needs of societies. Research in science and technology education needs to be furthered nationally and internationally through the establishment and networking of specialized centres around the world, with the cooperation of UNESCO and other relevant international organizations.

44. Educational institutions should encourage the contribution of students to decision-making concerning education and research.

45. Governments should provide increased support to regional and international programmes of higher education and to networking of graduate and postgraduate institutions, with special emphasis on North-South and South-South cooperation, since they are important means of helping all countries, especially the small or least developed among them, to strengthen their scientific and technological resource base.

46. Non-governmental organizations should play an important role in the sharing of experience in science teaching and education.

47. Educational institutions should provide basic science education to students in areas other than science. They should also provide opportunities for lifelong learning in the sciences.

48. Governments**,** international organizations and relevant professional institutions should enhance or develop programmes for the training of scientific journalists, communicators and all those involved in increasing public awareness of science. An international programme on promotion of scientific literacy and culture accessible to all should be considered in order to provide appropriate technology and scientific inputs in an easily understandable form that are conducive to the development of local communities.

49. National authorities and funding institutions should promote the role of science museums and centres as important elements in public education in science. Recognizing the resource constraints of developing countries, distance education should be used extensively to complement existing formal and non-formal education.

2.5 Science for peace and conflict resolution

50. The basic principles of peace and coexistence should be part of education at all levels. Science students should also be made aware of their specific responsibility not to apply scientific knowledge and skills to activities which threaten peace and security.

51. Governmental and private funding bodies should strengthen or develop research institutions that carry out interdisciplinary research in the areas of peace and the peaceful applications of S&T. Each country should ensure its involvement in this work, either at the national level or through participation in international activities. Public and private support for research on the causes and consequences of wars, conflict prevention and resolution should be increased.

52. Governments and the private sector should invest in sectors of science and technology directly addressing issues that are at the root of potential conflicts, such as energy use, competition for resources and pollution of air, soil and water.

53. Military and civil sectors, including scientists and engineers, should collaborate in seeking solutions to problems caused by accumulated weapon stocks and landmines.

54. A dialogue should be promoted between representatives of governments, civil society and scientists in order to reduce military spending and the orientation of science towards military applications.

2.6 Science and policy

55. National policies should be adopted that imply consistent and long-term support to S&T, in order to ensure the strengthening of the human resource base, establishment of scientific institutions, improvement and upgrading of science education, integration of science into the national culture, development of infrastructures and promotion of technology and innovation capacities.

56. S&T policies should be implemented that explicitly consider social relevance, peace**,** cultural diversity and gender differences. Adequate participatory mechanisms should be instituted to facilitate democratic debate on scientific policy choices. Women should actively participate in the design of these policies.

57. All countries should systematically undertake analyses and studies on science and technology policy, taking into account the opinions of all relevant sectors of society, including those of young people, to define short-term and long-term strategies leading to sound and equitable socio-economic development. A World Technology Report as a companion volume to the present UNESCO *World Science Report* should be considered in order to provide a balanced world opinion on the impact of technology on social systems and culture.

58. Governments should support graduate programmes on S&T policy and social aspects of science. Training in legal and ethical issues and regulations guiding international R&D in strategic areas such as information and communication technologies, biodiversity and biotechnology should be developed for scientists and professionals concerned. Science managers and decision-makers should have regular access to training and updating to cope with the changing needs of modern society in the areas of S&T.

59. Governments should promote the further development or setting up of national statistical services capable of providing sound data, disaggregated by gender and disadvantaged groups, on science education and R&D activities that are necessary for effective S&T policy-making. Developing countries should be assisted in this respect by the international community, using the technical expertise of UNESCO and other international organizations.

60. Governments of developing countries and countries in transition should enhance the status of scientific, educational and technical careers, and make determined efforts to improve working conditions, increase their capacity to retain trained scientists and promote new vocations in S&T areas. Programmes should also be set up or promoted to establish collaboration with scientists, engineers and technologists who have migrated from these countries to developed countries.

61. Governments should make an effort to use scientific expertise more systematically in policy-making addressing the process of economic and technological transformation. The contribution of scientists should be an integral part of programmes supporting either innovation or measures aimed at industrial development or restructuring.

62. Scientific advice is an increasingly necessary factor for informed policy-making in a complex world. Therefore, scientists and scientific bodies should consider it an important responsibility to provide independent advice to the best of their knowledge.

63. Governments at all levels should establish and regularly review mechanisms which ensure timely access to the best available advice from the scientific community drawing on a sufficiently wide range of the best expert sources. These mechanisms are to be open, objective and transparent. Governments should publish the scientific advice in media accessible to the public at large.

64. Governments, in cooperation with the agencies of the United Nations system and international scientific organizations, should strengthen international scientific advisory processes as a necessary contribution to intergovernmental policy consensus-building at regional and global levels and to the implementation of regional and international conventions.

65. All countries should protect intellectual property rights, while recognizing that access to data and information is essential for scientific progress. In developing an appropriate international legal framework, WIPO, in cooperation with relevant international organizations, should constantly address the question of knowledge monopolies, and WTO, during new negotiations of the TRIPS Agreement, should incorporate into this Agreement tools aimed at financing the advancement of science in the South with the full involvement of the scientific community. In this regard, the international programmes of ICSU and the five intergovernmental scientific programmes of UNESCO should play a catalytic role by, *inter alia*, improving the compatibility of data collection and processing, and facilitating access to scientific knowledge.

3. SCIENCE IN SOCIETY AND SCIENCE FOR SOCIETY

66. The practice of scientific research and the use of scientific knowledge should always aim at the welfare of humankind, be respectful of the dignity of human beings and of

their fundamental rights, and take fully into account our shared responsibility towards future generations.

3.1 Social requirements and human dignity

67. Governments, international organizations and research institutions should foster interdisciplinary research aimed specifically at identifying, understanding and solving pressing human or social problems, according to each country's priorities.

68. All countries should encourage and support social science research to better understand and manage the tensions characterizing the relations between science and technology on the one hand, and the different societies and their institutions on the other hand. Transfer of technology should be accompanied by analysis of its possible impact on populations and society.

69. The structure of educational institutions and the design of their curricula should be made open and flexible so as to adjust to the emerging needs of societies. Young scientists should be provided with a knowledge and an understanding of social issues, and a capacity to move outside their specific field of specialization.

70. University curricula for science students should include field work that relates their studies to social needs and realities.

3.2 Ethical issues

71. 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 Sciences (SCRES), have a special responsibility to follow up on this issue.

72. Research institutions should foster the study of ethical aspects of scientific work. Special interdisciplinary research programmes are needed to analyse and monitor the ethical implications and means of regulation of scientific work.

73. The international scientific community, in cooperation with other actors, should foster a debate, including a public debate, promoting environmental ethics and environmental codes of conduct.

74. Scientific institutions are urged to comply with ethical norms, and to respect the freedom of scientists to express themselves on ethical issues and to denounce misuse or abuse of scientific or technological advances.

75. Governments and non-governmental organizations, in particular scientific and scholarly organizations, should organize debates, including public debates, on the ethical implications of scientific work. Scientists and scientific and scholarly organizations should be adequately represented in the relevant regulating and decision-making bodies. These activities should be institutionally fostered and recognized as part of the

scientists' work and responsibility. Scientific associations should define a code of ethics for their members.

76. Governments should encourage the setting up of adequate mechanisms to address ethical issues concerning the use of scientific knowledge and its applications, and such mechanisms should be established where they do not yet exist. Non-governmental organizations and scientific institutions should promote the establishment of ethics committees in their field of competence.

77. Member States of UNESCO are urged to strengthen the activities of the International Bioethics Committee and of the World Commission on the Ethics of Scientific Knowledge and Technology and ensure appropriate representation.

3.3 Widening participation in science

78. Government agencies, international organizations and universities and research institutions should ensure the full participation of women in the planning, orientation, conduct and assessment of research activities. It is necessary that women participate actively in shaping the agenda for the future direction of scientific research.

79. The full participation of disadvantaged groups in all aspects of research activities, including the development of policy, also needs to be ensured.

80. All countries should contribute to the collection of reliable data, in an internationally standardized manner, for the generation of gender-disaggregated statistics on S&T, in cooperation with UNESCO and other relevant international organizations.

81. Governments and educational institutions should identify and eliminate, from the early learning stages on, educational practices that have a discriminatory effect, so as to increase the successful participation in science of individuals from all sectors of society, including disadvantaged groups.

82. Every effort should be made to eliminate open or covert discriminatory practices in research activities. More flexible and permeable structures should be set up to facilitate the access of young scientists to careers in science. Measures aimed at attaining social equity in all scientific and technological activities, including working conditions, should be designed, implemented and monitored.

3.4 Modern science and other systems of knowledge

83. Governments are called upon to formulate national policies that allow a wider use of the applications of traditional forms of learning and knowledge, while at the same time ensuring that its commercialization is properly rewarded.

84. Enhanced support for activities at the national and international levels on traditional and local knowledge systems should be considered.

85. Countries should promote better understanding and use of traditional knowledge systems, instead of focusing only on extracting elements for their perceived utility to the S&T system. Knowledge should flow simultaneously to and from rural communities.

86. Governmental and non-governmental organizations should sustain traditional knowledge systems through active support to the societies that are keepers and developers of this knowledge, their ways of life, their languages, their social organization and the environments in which they live**,** and fully recognize the contribution of women as repositories of a large part of traditional knowledge.

87. Governments should support cooperation between holders of traditional knowledge and scientists to explore the relationships between different knowledge systems and to foster interlinkages of mutual benefit.

FOLLOW-UP

88. We, participants in the World Conference on Science, are prepared to act with determination to attain the goals proclaimed in the *Declaration on Science and the Use of Scientific Knowledge*, and uphold the recommendations for follow-up described hereafter.

89. All participants in the Conference consider the *Agenda* as a framework for action, and encourage other partners to adhere to it. In so doing, governments, the United Nations system and all other stakeholders should use the *Agenda,* or relevant parts of it, when planning and implementing concrete measures and activities which embrace science or its applications. In this way, a truly multilateral and multifaceted programme of action will be developed and carried out. We are also convinced that young scientists should play an important role in the follow-up of this Framework for Action.

90. Taking into account the outcome of the six regional forums on women and science sponsored by UNESCO, the Conference stresses that special efforts should be made by governments, educational institutions, scientific communities, non-governmental organizations and civil society, with support from bilateral and international agencies, to ensure the full participation of women and girls in all aspects of science and technology, and to this effect to:

promote within the education system the access of girls and women to scientific education at all levels;

improve conditions for recruitment, retention and advancement in all fields of research;

launch, in collaboration with UNESCO and UNIFEM, national, regional and global campaigns to raise awareness of the contribution of women to science and technology, in order to overcome existing gender stereotypes among scientists, policy-makers and the community at large;

undertake research, supported by collection and analysis of gender-disaggregated data, documenting constraints and progress in expanding the role of women in science and technology;

monitor the implementation and document best practices and lessons learned through impact assessment and evaluations;

ensure an appropriate representation of women in national, regional and international policy- and decision-making bodies and forums;

establish an international network of women scientists;

continue to document the contributions of women in science and technology.

To sustain these initiatives governments should create appropriate mechanisms, where these do not yet exist, to propose and monitor introduction of the necessary policy changes in support of the attainment of these goals.

91. Special efforts also need to be made to ensure the full participation of disadvantaged groups in science and technology, such efforts to include:

removing barriers in the education system;

removing barriers in the research system;

raising awareness of the contribution of these groups to science and technology in order to overcome existing stereotypes;

undertaking research, supported by the collection of data, documenting constraints;

monitoring implementation and documenting best practices;

ensuring representation in policy-making bodies and forums.

92. Although the follow-up to the Conference will be executed by many partners who will retain the responsibility for their own action, UNESCO, in co-operation with ICSU - its partner in convening the Conference - should act as a clearing house. For this purpose, all the partners should send UNESCO information about their follow-up initiatives and action. In this context, UNESCO and ICSU should develop concrete initiatives for international scientific cooperation together with relevant United Nations organizations and bilateral donors, in particular on a regional basis.

93. UNESCO and ICSU should submit the *Declaration on Science and the Use of Scientific Knowledge* and *Science Agenda - Framework for Action* to their General Conference and General Assembly respectively, with a view to enabling both organizations to identify and envisage follow-up action in their respective programmes and provide to them enhanced support. The other partner organizations should do likewise vis-à-vis their governing bodies; the United Nations General Assembly should also be seized of the outcome of the World Conference on Science.

94. The international community should support the efforts of developing countries in implementing this Science Agenda.

95. The Director-General of UNESCO and the President of ICSU should ensure that the outcome of the Conference be disseminated as widely as possible, which includes transmitting the *Declaration* and the *Science Agenda - Framework for Action* to all countries, to relevant international and regional organizations and to multilateral institutions. All participants are encouraged to contribute to such dissemination.

96. We appeal for increased partnership between all the stakeholders in science and recommend that UNESCO, in cooperation with other partners, prepare and conduct a regular review of the follow-up to the World Conference on Science. In particular, no later than 2001, UNESCO and ICSU shall prepare jointly an analytical report to governments and international partners on the returns of the Conference, the execution of follow-up and further action to be taken.

General Conference
30th Session, Paris 1999

30 C

30 C/15 Add.
25 October 1999
Original: English

Item 4.6 of the provisional agenda

DECLARATION ON SCIENCE AND THE USE OF SCIENTIFIC KNOWLEDGE AND THE SCIENCE AGENDA - FRAMEWORK FOR ACTION

ADDENDUM

1. At its final session on 30 September 1999, the 26th General Assembly of the International Council for Science (ICSU), meeting in Cairo, Egypt, unanimously endorsed the two principal documents of the World Conference on Science: the *Declaration on Science and the Use of Scientific Knowledge* and the *Science Agenda - Framework for Action*.

2. In doing so, the General Assembly adopted the following resolution:

World Conference on Science

The 26th General Assembly of ICSU,

Noting the successful holding of the World Conference on Science in Budapest from 26 June to 1 July 1999,

Recognizes and appreciates the partnership with UNESCO in the organization and staging of the Conference;

Records its grateful appreciation to the Hungarian Government and the Hungarian Academy of Sciences for their generosity and cooperation in hosting the conference;

Expresses concern about parts of the documents adopted by the Conference, notably paragraph 26 of the *Declaration on Science* and section 3.4 *Modern science and other systems of knowledge of the Framework for Action;* of particular concern is the phrase "traditional and local knowledge systems". The importance of empirical knowledge built up over generations and grounded in practical evidence is acknowledged but such knowledge must be distinguished from approaches that seek to promote anti-science and psuedo-science, and which degrade the values of science as understood by the ICSU community. ICSU reaffirms its support for the values and methods of verifiable science;

Recognizing that the relation between traditional knowledge and modern science is both important and a highly complex political and sociological question and one that cannot be addressed in a few lines of a wide-ranging document,

Requests the Executive Board of ICSU to set up a critical study of this issue;

With the above reservations, the 26th General Assembly of ICSU,

Decides to endorse the two principal documents of the Conference: the *Declaration on Science and the Use of Scientific Knowledge and the Science Agenda - Framework for Action*, taking into account the concerns expressed; and

Urges all ICSU Members to:

distribute and make both documents and this resolution widely known among members of the scientific community, promote the principles set out in the *Declaration*, and take the appropriate steps to translate into concrete action the *Science Agenda - Framework for Action* by implementing the recommendations set out within it, forging new partnerships to do so;

keep the ICSU Secretariat regularly informed of all measures they have taken to implement the *Science Agenda - Framework for Action*.

United Nations
Educational, Scientific and
Cultural Organization

COMEST

World Commission on the Ethics of
Scientific Knowledge and Technology
6th Ordinary Session
Kuala Lumpur, Malaysia
16-19 June 2009

Ref: SHS/EST/COMEST2009/pub-3.1

World Commission on the Ethics of Scientific Knowledge and Technology

Draft 3

Report on Science Ethics

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Introduction

"Science ethics" refers to the principles according to which scientific activity should be conducted and to the mechanisms by which conformity to such principles is promoted, fostered or ensured.

An ethical approach to science is not an external imposition. On the contrary, science depends on ethical values that are intrinsic to the quest for knowledge and understanding, such as integrity, truth and respect for reasoned argument and evidence. However, the practical pressures under which science is conducted cannot guarantee that such values always be recognized or honoured. Furthermore, public support for science depends on the perception that knowledge is not only pursued diligently and impartially for its own sake, but also contributes to broader human needs or well-being. Science thus connects to external values that neither clash with nor simply duplicate its own internal logic.

The field of science ethics is broad and in some respects controversial. It concerns not just professional scientists but also all those with responsibility for research policies and the communication of scientific knowledge to relevant audiences. It is thus considerably broader than "research ethics", which refers only to one specific area of professional conduct. The wider group of responsible stakeholders includes UNESCO, in pursuance of its established normative mandate, but also states, with respect to the implementation of internationally agreed principles, and bodies such as professional associations, universities and academies, without which ethical principles cannot be embedded in routine scientific practice.

The thematic and disciplinary scope of science ethics is also broad. As defined by Article 1(a)(i) of the 1974 Recommendation on the Status of Scientific Researchers, science "signifies the enterprise whereby mankind, acting individually or in small or large groups, makes an organized attempt, by means of the objective study of observed phenomena, to discover and master the chain of causalities". There might be scope for debate whether this view of science extends to the human sciences, where the notion of "causality" may not be appropriate. In addition, current debates in epistemology might call into question the kind of "objectivity" taken for granted in 1974. Nonetheless, the emphasis on science as a socially organized activity characterized by its structures and procedures ensures that the definition is inclusive with respect to the many different ways of doing science. Article 1(a)(i) of the 1974 Recommendation further stresses this point by adding two additional features to the definition. First, science "brings together in a coordinated form the resultant sub-systems of knowledge". The various *sciences* are thus explicitly components of *science*. Secondly, science provides humankind with knowledge that it can use "to its own advantage". No definitional line is drawn, therefore, between science and technology or between basic and applied science. Finally, Article 1(a)(ii) explicitly states, for the avoidance of doubt, that "The expression 'the sciences' (…) includes the sciences concerned with social facts and phenomena", at least in so far as they comprise "a complex of fact and hypothesis, in which the theoretical element is normally capable of being validated".

There is a body of internationally agreed ethical principles for science, as thus broadly defined, that includes universal normative documents (e.g. the 1974 Recommendation on the Status of Scientific Researchers, the 1999 Declaration on Science and the Uses of Scientific Knowledge); regional agreements (e.g. within the European Union and the African Union); and agreements on matters other than science ethics that include principles of direct relevance to science

ethics (e.g. the 1992 Convention on Biological Diversity). While these principles are of continuing relevance, and provide valuable guidance for practical action to support a general ethical framework for scientific conduct, they are neither complete nor fully consistent. The extensive network of complementary principles adopted in professional or institutional settings helps to provide a more complete framework but, given their diversity and lack of coordination, such principles do not guarantee consistency. Furthermore, their authority typically does not extend beyond those individuals or institutions that have subscribed to them.

Mechanisms for ensuring practical implementation of agreed ethical principles are themselves diverse and uneven.

A framework for science ethics that can be evaded with ease and impunity by those who reject it would necessarily fall short of the ambitious objectives set by existing international normative instruments.

Since the existing international framework is incomplete and only partly operative, it is an open question whether established principles require development, expansion, refinement and perhaps even revision in light of changing circumstances or emerging ethical challenges. Such challenges may derive from issues that have recently acquired enhanced relevance to the international community (e.g. in the various areas covered by environmental ethics) or from scientific and technological advances that appear to undermine or destabilize existing ethical principles or mechanisms (e.g. nanoscience and the various forms of nanotechnology, especially in so far as they may converge with other areas of scientific and technological development, such as in the life sciences).
UNESCO is therefore called upon to reflect, on an ongoing basis, on ethical concerns that may, after due consideration, call for action to regulate scientific conduct in specific ways. The current basis for such reflection is provided by the decision adopted by the Executive Board, at its 175th session in 2006, to endorse the recommendations made by COMEST to the Director-General following its 2006 Extraordinary Session. These were as follows:[1]

> "1. Member States should be reminded of the principles adopted by them in the 1974 Recommendation on the Status of Scientific Researchers, and this instrument, together with the Declaration on Science and the Use of Scientific Knowledge, should be taken as a general reference for future works;
> 2. An assessment, from an ethical perspective, of the implementation of previous work of UNESCO in this area was deemed necessary, especially the 1974 Recommendation and the Declaration on Science and the Use of Scientific Knowledge.
> 3. The work that has been undertaken by UNESCO so far, such as the collection of codes of conduct worldwide, the critical and comparative analysis of existing codes, as well the elaboration of educational tools should be supported and encouraged;
> 4. Further international reflections and consultations should be carried out and fostered in order to identify a general ethical framework to guide scientific activity that will cover other stakeholders beyond the focus on scientists;
> 5. UNESCO, with the advice of COMEST, should work out such a general ethical framework;
> 6. The subsequent elaboration and/or implementation of specific codes of conduct for scientists should rely on Member States and the scientific community;

[1] Document 175 EX/14, p. 7.

> 7. In this regard, it is necessary to set up a wide participatory process, involving all stakeholders as well as the society at large with a view to initiate actions in relevant sectors in the society."

The two-level structure of this mandate should be stressed. UNESCO is invited to *act* in certain specific areas, but to *reflect* on science ethics as a whole. Effective action "in relevant sectors in the society" requires both shared thinking within the terms of "a general ethical framework to guide scientific activity" and differentiated responsibilities consistent with diversified institutional competence.

The task of COMEST, similarly, is wide-ranging. In all areas of concern, COMEST is called upon to provide independent advice to the Director-General of UNESCO by formulating, on a scientific basis, ethical principles that can shed light on the various choices and impacts occasioned by new advances in scientific and technological fields, thus fostering a constructive ethical dialogue on the values at stake. Such advice should be sensitive to the institutional competence of UNESCO, but not restricted by it.

The structure of this report reflects these concerns. It first reviews the key ethical challenges for science, many of which have unclear implications for the very diverse institutions involved. Section 3 analyzes the existing normative framework for science ethics, emphasizing its diversity and the very different levels of competence involved. In section 4, past and ongoing COMEST work on science ethics is reviewed and specific conclusions drawn on both substantive and procedural issues. Finally, section 5 formulates recommendations designed to ensure that the decisions of the Executive Board are adequately followed up. The stakes are high in this respect. Given current challenges, it cannot be assumed that, in the absence of an appropriate "general ethical framework to guide scientific activity", science will necessarily conform to the ethical standards laid down in the internationally agreed normative instruments. As a result, the integrity of science may be damaged and its capacity to contribute to human well-being impaired. Science ethics is not an optional add-on to science, but rather a constitutive feature of it.

Key ethical challenges for science

Science ethics does not currently have an up-to-date, comprehensive and consensus-based normative framework. In view of the fragmented and in some respects dated ethical basis for science (see section 3), there are a number of major ethical challenges that require new reflection and, possibly, new action.

INCOMPLETE PRINCIPLES

There is no comprehensive normative instrument that deals exclusively with science ethics and addresses all aspects of the subject. As a result, any attempt to analyze the existing normative framework must start from a disparate set of documents, adopted at different times and levels and for different purposes, and the content of which is not coordinated. Section 3 provides such an analysis. For the purposes of this section, it suffices to note that the 1999 Declaration on Science and the Uses of Scientific Knowledge makes no reference to the 1974 Recommendation on the Status of Scientific Researchers, even though they cover much of the same ground.

Unsurprisingly, the various components of the existing normative framework dovetail imperfectly. In some cases, different documents may overlap, with the result that distinct and possibly incompatible principles may apply to the same issue. In other cases, there may be gaps covered by none of a range of potentially applicable instruments. The likelihood of such gaps is increased by the dynamic of scientific and technological change, which redraws the boundaries of disciplines and scientific fields (see section 2.3).

Furthermore, even considered in isolation, some normative instruments may appear dated or even obsolete. This affects not so much the general principles they state, which are as durable as the basic conception of science that underpins them, as the language in which they are expressed, the institutional setting they presume, and the mechanisms they are related to. As discussed in detail in section 3.1, the 1974 Recommendation on the Status of Scientific Researchers is particularly open to challenge in this respect.

What this entails for science ethics at international level is the need to establish a basis for practical discussion, involving all relevant stakeholders and taking account of the very different levels at which ethics may call for institutionalization, on the new ethical developments that may be required by contemporary social pressures or by the internal logic of ethical deliberation itself.

NEW SOCIAL/INSTITUTIONAL CONTEXTS

Science is a social activity, and not simply an epistemic one. To be a scientist is to be a certain kind of professional, and not simply to be the producer of a certain kind of knowledge. These points, which are familiar from the contemporary sociology of science, also follow directly from the definition adopted by the 1974 Recommendation on the Status of Scientific Researchers. The straightforward implication is that changes in the social or institutional context within which science is conducted have consequences for science and for scientific knowledge. It is generally agreed that the context has indeed undergone significant changes in recent decades.

Many of these changes are a consequence of the considerable expansion of student numbers along with forms of globalization that have combined to erode traditional academic communities and self-understandings. While there are many

positive aspects to this change, it has also undermined the historically constituted basis of scientific integrity without, hitherto, producing robust alternatives. The challenge is all the greater that any global standard of integrity now needs to incorporate a greater diversity of cultural practices and value systems than in the past.

Expansion and globalization have also coincided with growing commercial pressures, due to the movement towards privatization in some countries, greater pressure to rank and to evaluate researchers and institutions, public funding retrenchment in higher education and research, and the high profitability expectations associated with cutting edge development, especially in the life sciences. One practical consequence has been a tendency towards contractualization of scientific research, with conditions attached that may conflict with traditional principles of open access and public benefit.

It is controversial whether the frequency and severity of scientific research misconduct – fabrication, falsification and plagiarism – and of questionable research practices have increased. The problems may, after all, be simply more extensively studied and investigated. Nonetheless, even the possibility that the institutional conditions in which science is conducted may be undermining science ethics is a matter for concern and deliberation.

Finally, new expectations addressed to science, particularly in connection with environmental issues, point towards the need for a more expansive conception of science ethics, of which the much-discussed precautionary principle is exemplary. Broader conceptions of risk and uncertainty are current within contemporary societies and create challenges not just for the predictive capacity of science but also for its ability to maintain public trust. While there is general agreement that science should take responsibility for its unintended consequences and contribute to the capacity of humankind to deal with ever more complex and long-range causal chains, it is unclear which specific responsibilities should be shouldered by which scientists or scientific institutions in this regard.

SCIENTIFIC AND TECHNOLOGICAL CHANGE

Quite apart from the changing social and institutional context, the internal development of science itself is producing new ethical challenges. These may require new principles or refinement of existing principles. They may also, and perhaps are more likely to, require development of new mechanisms for the institutionalization of ethics that are adapted to a changed environment.

The key scientific changes tend to fall into three distinct but interrelated categories.

First, scientific and technological development throws up new objects that may have ethical implications. This possibility is most familiar from bioethics, but can also be generalized. For instance, it should at least be considered whether nanoscale manipulation raises specific issues even without reference to actual or hypothetical technological applications. Ultimately, one might ask whether the very definition of science adopted in the 1974 Recommendation on the Status of Scientific Researchers, as quoted in the introduction to this report, requires revision. The fact that such a conclusion would undoubtedly be premature at the present stage of scientific and technological development does not mean that the question should not be asked on an ongoing basis.

Secondly, and much more importantly in light of current concerns in public debate, scientific and technological development produces new capacities for action and

therefore new risks of ethically undesirable consequences, whether intended or unintended. Examples are familiar and largely overlap with the areas referred to in section 2.2 in which science and technology give rise to new fears and new expectations. The possibility that new technologies might, through deliberate use or accidental release, cause serious and irreversible harm calls for new forms of vigilance that affect both the burden and the standard of proof. In particular, it is a major challenge – exemplified by debates on genetically modified crops and foods and on atmospheric and electromagnetic pollution – to establish scientifically sound ways of dealing with public debates about competing unproven hypotheses that claim to demonstrate or to dismiss harmfulness.

Thirdly, new scientific and technological developments may reshape the professional landscape of science in ways that challenge established institutional ethics procedures. A relevant example in this respect is converging technologies: the reshaping of connections between areas of technology might undermine or destabilize existing ethical frameworks. For example, codes of conduct or ethical codes based on disciplines and enforced by disciplinary scientific associations might be rendered obsolete by people working in cutting-edge converging technology, whose work may escape existing normative frameworks or regulations. There is a need, therefore, to adapt on an ongoing basis the institutional framework guiding scientific conduct in order to ensure that cutting-edge research is not escaping the purview of ethics. Action at a global level may be required to make scientists aware of their social responsibilities and to help Member States develop and implement mechanisms to inform about the pros and cons of such technological developments.

ACCESS TO SCIENTIFIC INFORMATION

At the most general level, access to scientific information may be regarded as a human right. Article 27(1) of the Universal Declaration of Human Rights unambiguously declares, for all human beings, the right "to share in scientific advancement and its benefits". The benefits of scientific advancement could, conceivably, be shared equitably while science remains under the restrictive control of certain social groups, corporate entities or states. However, the Declaration specifically refers not just to the benefits but to scientific advancement itself. This implies equitable participation in the global community of science, and therefore a fair basis for access to scientific information.

What this entails in practice is less clear-cut, particularly as several distinct issues are involved, including the distinct intellectual property regimes of copyright and patent, mobility of scientific personnel, and confidentiality for research considered sensitive by its funders. The 1974 Recommendation on the Status of Scientific Researchers does state explicitly "that open communication of the results, hypotheses and opinions – as suggested by the phrase 'academic freedom' – lies at the very heart of the scientific process, and provides the strongest guarantee of accuracy and objectivity of scientific results".[2] Similarly, and more vaguely, the 1999 Declaration on Science and the Uses of Scientific Knowledge does enshrine "the importance of total, unrestricted access to scientific research and education and to information and data" (article 16). The institutional implications are, however, left unspecified except with respect to the right of scientists to publish their work.

Clarification of such matters is an important issue for science ethics. Contemporary challenges such as changing modes of publication, new

[2] The quotation marks around "academic freedom" are in the original text. The phrasing may require consideration with respect to its current acceptability.

commercial and security pressures, evolving technologies, etc., are redistributing the conditions of access to scientific information in ways that risk creating new barriers detrimental to developing countries even as they remove some traditional obstacles to the circulation of scientific information.

Publication issues are of great significance in this respect, and ongoing debates about open access deserve careful ethical consideration. This will be facilitated if open access is not regarded, as it sometimes is, as an intellectual property regime. In fact, open access says nothing about copyright or its absence. In addition, it should be noted that the phrase “open access” does not prejudge how such access is to be ensured and how it affects the scientific information available. Commercial open-access models effectively shift part of the cost of publication from the reader to the author, while typically maintaining traditional quality control. Whether, on balance, such a move favours or hampers the equitable participation of developing-country scientists in global science is a question that would require careful study. Non-commercial open-access models tend to require third-party funding and may also entail reduced quality control. The distributive implications, again, are not clear-cut. Finally, the Internet is itself a medium of publication, and not simply of dissemination of published material. However, while self-published information may be “open-access” for the reader, it may not have the same scientific status as other information available through the same medium. Whether the indiscriminate nature of information available via Internet raises ethical issues is a matter for careful consideration.

However, no consideration of access to scientific information that focuses exclusively on modalities of publication can be regarded as adequate. Open access to published material does not and cannot ensure effective access to unpublished material or to data and other background information, which may be more important for availability than the written-up version of the results. Nor is this concern merely abstract. It is well known that commercial funding of research – which is of growing significance in many areas, including in particular the life sciences – may involve contractual limitations on publication of results. Similarly, editors of scientific journals have expressed major concerns about the difficulties in reviewing papers in the absence of the data on which they are based, and have in some cases introduced requirements to make available such data to referees, typically on a confidential basis. It is therefore equally important to reflect ethically on what should be published – and how – and on access to resources such as data that are not in any strict sense publishable.

EDUCATION, TRAINING AND AWARENESS-RAISING

Science ethics cannot be reduced to principles, or even to institutional mechanisms to investigate and if appropriate punish unacceptable behaviour. The challenge is to embed ethics in routine scientific practice: to make it, as already emphasized, not an optional add-on but a constitutive component of science. In order to meet this challenge, it is essential to act at a range of different levels to build awareness of science ethics among not just professional scientists but also technicians and all people actively working in science and technology. Avoiding deliberate misuse of science is undoubtedly an important ethical issue, but it is unlikely that it can be addressed solely or even mainly through education. Avoidance of inadvertent failure to meet high ethical standards, on the other hand, depends on education and training, although it cannot be achieved without adequate institutional oversight.

Consideration should therefore be given to gaps in existing provision of education and training and possible action, with a particular focus on international coordination and cooperation and on capacity building in developing countries. If

it is the case that, in certain areas, not enough is being done, there are potentially important practical consequences, which concern the capacity of science and technology to respond to human needs or well-being, possibly harmful side-effects, and public trust in science.

Finally, awareness of ethical issues in science and of the steps taken by relevant institutions to promote science ethics can contribute usefully to public trust in science. There is much existing and valuable work in outreach, public information and popularization, and to a lesser extent in effective public participation in social choices about science and technology. There may however be gaps that need to be addressed by new kinds of initiatives.

GLOBAL GOVERNANCE

The need to embed ethics in routine scientific practice establishes a strong connection between science ethics and science policies. The integrity and credibility of science do not depend solely on the values, attitudes and behaviour of individual scientists. There are crucial background institutional conditions, defined in particular by science policies, for which individual scientists cannot be held responsible.

Ethics is therefore not just a matter of principles, but also of governance. At national level, ethical institutions and mechanisms may need strengthening, especially in developing countries. Action may also be required to address gaps in international coordination at regional and global level. In order to reflect on what might need to be done, it is important to clarify what the global governance might entail and what its ethical features might look like.

In general terms, science governance depends on answers to three interrelated questions:

1. How to build response to key social needs – or, more generally, promotion of human well-being – into science policies, in the differentiated ways appropriate to the various levels at which the interface operates (priority setting and programming, funding, higher education, institutional design in research systems, etc.)?

2. How to weave together the necessary autonomy of science, which is internally connected to its integrity, with accountability and with responsiveness to externally generated priorities? This is of course a tension, not a clash: scientists as citizens may well share the externally generated priorities, but cannot be assumed or required to do so.

3. How to channel the results of science into a policy process that can actually address social produce the intended outcomes by which it is legitimized?

Adequate answers to these questions may be expected to have positive, mutually reinforcing effects on both the conduct of science itself and public understanding of and attitudes towards science. In turn, such positive effects serve as favourable preconditions for more dynamic science backed and effectively utilized by more vigorous policies.

Among the key issues to be addressed within a framework for global governance of science are science divides (notably in relation to development) and the related capacity-building challenges, private-sector science, research policies, and applications of science to concrete policy issues. The challenge in this regard

is not to establish some kind of global regulatory mechanism – for which UNESCO, in particular, would not be competent – but rather to facilitate cooperation, interchange, coordination etc. of existing mechanisms and across disciplines in order to improve the effectiveness of ethical frameworks that already exist.

Existing normative framework for science ethics

The existing normative framework may be in some respects out of date, it may not be comprehensive, and it may be fragmented. Nonetheless, it is richly developed and offers an indispensable starting point for future development.

1974 RECOMMENDATION ON THE STATUS OF SCIENTIFIC RESEARCHERS

As its title implies, the 1974 Recommendation is not simply an ethical document, but also covers a wide range of other issues. The drafters were, to quote the preamble, "Persuaded that [concrete action for the introduction and pursuit of adequate science and technology policies] can considerably assist in the creation of those conditions, which encourage and assist indigenous capability to perform research and experimental development in an enhanced spirit of responsibility towards man and his environment". They thus sought to combine in one document considerations on science ethics and on science policies that sketch a strong framework to support science for society.

This background conviction explains the choice of subject matter and wording for the Recommendation. "The word 'status' as used in relation to scientific researchers signifies the standing or regard accorded them, as evidenced, first, by the level of appreciation both of the duties and responsibilities inherent in their function and of their competence in performing them, and, secondly, by the rights, working conditions, material assistance and moral support which they enjoy for the accomplishment of their task." (article 1(e)). Such structural features connect to science ethics as the institutional background that makes ethical science possible.

Another paragraph of the preamble makes this link very clear:

> "a) scientific discoveries and related technological developments and applications open up vast prospects for progress (…) but may, at the same time, entail certain dangers which constitute a threat especially in cases where the results of scientific research are used against mankind's vital interests (…) and in any event give rise to complex ethical and legal problems;
> b) to face this challenge, Member States should develop or devise machinery for the formulation and execution of adequate science and technology policies, that is to say, policies designed to avoid the possible dangers and fully realize and exploit the positive prospects inherent in such discoveries, technological developments and applications."

It seems reasonable, therefore, to interpret the Recommendation as a whole in an ethical light. Institutional matters such as working conditions (articles 20 and 21), professional training (article 22), mobility and career development (articles 23-25 and 28), social insurance (articles 29 and 30), evaluation (articles 32-34), and publication and intellectual property issues (articles 35-40), are not ethical in themselves, but they do provide an indispensable background for ethical behaviour.

Ethical science thus *requires* a certain mode of institutionalization of which professional, adequately trained, permanent and secure researchers are an essential component. It follows that monitoring the status of scientific researchers is not a task tangentially connected to ethics, and perhaps better conducted in an

alternative framework of assessment of national research systems, but on the contrary a core task of science ethics. Indeed, the weakness of a research system, in terms of the standard variables by which it can be characterized (policies, resources, scientific performance, response to social needs, interdisciplinary networking), may be expected to correlate strongly with the likelihood of unethical behaviour within it. Consistently with the perspective sketched in section 2 of this report, this entails a distinctive perspective on ethics. Ethical behaviour should not be seen as a form of "heroism", accessible only to people who are for whatever reason "virtuous". Rather ethics is something to be "routinized" by capacity building that embeds it in the ordinary institutional structures of science.

Conversely, the intimate link between science policy and science ethics precludes subjection of science to ethical perspectives not derived from the logic of science itself. The purpose of an ethical approach to science is not to block scientific progress or to regulate scientific activity but on the contrary to allow them fully to flourish.

Keeping in mind the general articulation between principles and institutions, the key substantive ethical principles of the Recommendation can be summarized quite simply. They converge on the responsibilities incumbent on researchers as a corollary of the status afforded to them. The word "responsibility" occurs on numerous occasions in the Recommendation, and refers to several separate but connected issues.

- Responsibility to ensure that science serves the interests of humanity as a whole: "the full potentialities of scientific and technological knowledge [should] be promptly geared to the benefit of all peoples" (article 19).
- Responsibility of scientists to conduct themselves in accordance with high ethical standards: "effective scientific research calls for scientific researchers of integrity and maturity, combining high moral and intellectual qualities" (article 10). The availability of such researchers in turn depends on effective education, training and wareness-raising at all levels.
- Responsibility to respect accountability to the public, as a corollary of enjoyment of "the degree of autonomy appropriate to their task and to the advancement of science and technology" (article 8).
- Generic requirement of humane, social and ecological responsibility in research conduct (article 14 as quoted above), "social" responsibility being interpreted in terms of service to one's own country (article 9(c)) and of "community service" (article 11(b)).
- Specific responsibility to be "vigilant" with respect to the "probable and possible social and ecological consequences of scientific research and experimental development activities" (article 12(b)(iv)).

In generic terms, these general statements about responsibility appear to have enduring relevance. Nonetheless it is important to note that the 1974 Recommendation is in some respects dated. Thus, the Recommendation takes for granted a primarily "public sector" framework for science[3] and assumes implicitly that the major threats from inappropriate scientific research or misuse of research results or scientific knowledge relate to the Cold War logic of the "arm's race". Conversely, major issues of contemporary concern are not explicitly dealt with, although they may of course be adequately covered by the general principles enshrined in the Recommendation. Such issues include the public

[3] Although article 2 does explicitly extend the scope of the Recommendation to all researchers, irrespective of employment status.

character of science, in terms of both the organization of its activities and access to its knowledge; post-Cold War security concerns; environmental threats; the relation of science to the dynamics of globalization; and the implications (especially ethical) of new forms of science and recent technological breakthroughs. In addition, contemporary concerns about gender inclusiveness are unsurprisingly absent from the text.

Of particular significance is the fact that, while the exclusive emphasis on public science may have been reasonable in 1974, not least in terms of defining the responsibilities that specifically belong to Member States, many contemporary concerns relate to scientific conduct regardless of its institutional setting, and therefore appear to call for a framework that is less oriented towards research policies, broadly understood, and more focused on individual scientists and scientific communities. If so, while Member States would undoubtedly continue to have a key regulatory role, not least via their science and technology policies, a broader perspective on "codes of conduct" for scientists might be required, taking account of the full range of voluntary and mandatory professionally enshrined mechanisms for ethical regulation.

As a result, there is a two-fold challenge. On the one hand, implementation of the 1974 Recommendation, with its limitations, must be monitored as effectively as possible, since it remains a highly relevant statement of the intimate link between science policies and science ethics and since its basic ethical principles have lost none of their validity. On the other hand, ongoing reflection is required to ensure that the general ethical framework to guide scientific activity – which should include but cannot be limited to the 1974 Recommendation – is kept up to date and constantly connected to the concrete exigencies of science.

1999 DECLARATION ON SCIENCE AND THE USES OF SCIENTIFIC KNOWLEDGE

Given its limitations and the need to reflect on its continuing relevance, the Recommendation should also be considered in light of the 1999 Budapest Declaration on Science and the Uses of Scientific Knowledge, first adopted by the World Science Congress and subsequently endorsed by the UNESCO General Conference, along with the Action Plan addressing broad science policy issues adopted at the same Conference.

It is important to note, however, that the Declaration does not have the same normative status as the Recommendation and does not currently command universal respect. Furthermore, the Declaration is neither an application, nor an extension, supplement or replacement, of the Recommendation, to which it makes no specific reference. Nonetheless, the existence of the two instruments entails that a connection be established between them.

The Declaration has a similar ethical orientation to the Recommendation. However, it is updated substantively to take account of new concerns, including specifically "the growing complexity of the relationship between society and its environment". In addition, it is unconnected to detailed institutional considerations, and it is premised upon a much broader understanding of the stakeholders of science. In addition, the Declaration addresses a number of issues outside the scope of ethics strictly understood that lacked prominence in 1974, such as globalization, the information and communication revolution, biodiversity and sustainability, gender balance, disadvantaged groups, and traditional and local knowledge systems.

The main ethical issues covered by the Declaration are as follows:

- science should be for the benefit of humanity as a whole (article 1) but, alongside its benefits, has led to "environmental degradation and technological disasters, and (…) contributed to social imbalance or exclusion";

- scientists have "a special responsibility for seeking to avert applications of science which are ethically wrong or have an adverse impact" (article 21) – a responsibility more specific and far-reaching than provided for in the Recommendation;

- a specific requirement is placed upon Member States to "establish suitable measures to address the ethics of the practice of science and of the use of scientific knowledge and its applications" (article 40), which goes beyond the background institutional framework of the Recommendation;

- "science curricula should include science ethics" (article 41), which reflects the emphasis in the Recommendation on education and training, but goes beyond it in giving "science ethics" intellectual autonomy as a sub-discipline, and not simply a topic.

OTHER RELEVANT INTERNATIONAL NORMATIVE SOURCES

A number of international normative documents state principles of direct relevance to science ethics, although their specific subject matter may be different. Documents will be reviewed in order to identify principles that could contribute to the general ethical framework to guide scientific activity, with particular emphasis on areas such as bioethics and environmental ethics.

OTHER RELEVANT SOURCES AT NATIONAL OR REGIONAL LEVEL

Numerous normative documents have been produced at national and regional level. It remains to be determined whether a review of national legislation, regulation, voluntary codes etc. is appropriate or useful for the purposes of COMEST's reflection on science ethics.

OTHER RELEVANT SOURCES AT PROFESSIONAL OR INSTITUTIONAL LEVEL

Science ethics is extensively institutionalized within professional and institutional settings on which considerable information available (e.g. from the Global Ethics Observatory). It remains to be decided how far to go in describing or analyzing them for the purposes of this report.

REVIEW OF PAST AND ONGOING COMEST WORK ON SCIENCE ETHICS

COMEST has, from its inception, been considering science ethics both in general and in specific areas.

Current work is set within UNESCO's strategy to address ethical issues relating to science and technology. The key strategic challenge in the current Medium-Term Strategy (2008-13) [4] is "to ensure the monitoring and analysis of the impact

[4] It should be noted that the Medium-Term Strategy covers all areas of ethics of science and technology and in particular makes no distinction between bioethics and other

of scientific and technological innovations on human rights through the strengthening of its action on the ethics of science and technology". The emphasis on human rights requires additional conceptual development, particularly with respect to the implications for science ethics of the right "to share in scientific advancement and its benefits" enshrined in the Universal Declaration of Human Rights (article 27(1)).

With this strategic challenge in mind, the key areas of work are defined as follows:

- "Establish and promote common values and benchmarks, as well as to promote ethical principles and standards to guide scientific progress and technological development, especially in developing countries that do not enjoy equal benefits of scientific and technological advances.
- Examine scientific progress in light of ethical considerations rooted in the cultural, legal, philosophical and religious heritage of the communities involved.
- Seek to create a better understanding of the major ethical issues raised by science and technology and support analysis and discussion of those issues internationally, regionally and nationally.
- Support the implementation and refinement of existing normative instruments, and the application of practices and tools to facilitate the growth and use of science and technology respecting human dignity and human rights.
- Support the development of new instruments as may be deemed necessary by the governing bodies.
- Promote ethical reflections and decision-making, including through international cooperation and the sharing of experience.
- Promote the application of the instruments and guidelines and strengthen their impact.
- Provide a forum for an interdisciplinary, multicultural and pluralistic reflection on new and emerging global issues, bringing together the intellectual and scientific communities, policy-makers, public and private stakeholders and actors of civil society.
- Establishment and reinforcement of national bodies and mechanisms of COMEST bodies.
- Involvement of society at large by raising awareness, undertaking advocacy and stimulating an open democratic debate about the ethical implications of scientific and technological developments and the link between ethics and governance.
- Ethics education for young scientists, professionals and trainers."

The UNESCO strategy does not constitute a restriction on the work of COMEST, which is empowered to advise the Director-General on any areas of ethics it may consider appropriate. The strategy does, on the other hand, indicate to COMEST the areas where its contribution to UNESCO's activities is particularly expected.

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areas. For programmatic purposes, however, bioethics is dealt with separately because of its uniquely well-developed normative basis. There are areas of intersection between bioethics and science ethics within the competence of COMEST (such as the regulation of conduct in the life sciences) but they do not extend to the substantive concerns of bioethics as enshrined, for instance, in the 2005 Universal Declaration on Bioethics and Human Rights.

Applied to science ethics, this strategic framework serves as a reminder of the necessary articulation between analysis of challenges, elaboration of principles, development of mechanisms, and awareness-raising, education and training.

The existing normative framework implies a pluralized and "distributed" model of ethics in which multiple sites with distinct logics combine to promote and entrench ethics at all levels of scientific conduct. The UNESCO Medium-Term Strategy explicitly reflects this multi-level approach to ethics, and effectively distinguishes six levels of ethical institutionalization, all of which are relevant to UNESCO although not all fall directly within the Organization's programmes:

- international normative standards and indicative ethical frameworks;
- national legislation and regulations;
- national ethics committees and similar bodies;
- institution-specific processes, including employment contracts and institutional ethics committees;
- ethics education and training, including the full range of awareness-raising activities;
- the various issues relating to dissemination and circulation of scientific information, including in particular the ethical aspects of publication.

It is important for COMEST to consider which levels of action should be emphasized, and which institutions should take responsibility for them.

With respect to past and current work, as well as possible future developments, the following specific areas (among others) deserve more detailed comment.

CONSULTATIONS

In light of concerns about the substantive relevance and normative status of the 1974 Recommendation and 1999 Declaration, it might reasonably be considered whether the most appropriate institutional response would not be to develop a new, more comprehensive and fully up-to-date, but at the same time specifically ethical, normative instrument. The 2005 UNESCO General Conference did indeed request the Director-General to review this issue and report on the advisability of elaborating an "international declaration on science ethics" to serve as a basis for an "ethical code of conduct for scientists".

However, when the Director-General duly reported to the Executive Board in 2006, he concluded that adoption of a new normative instrument was not the most appropriate mechanism to take forward the ethical concerns expressed by Member States.

This conclusion, which the Executive Board endorsed, was based on a series of regional and national expert consultation meetings held in Krakow, Poland (March 2006), Tokyo, Japan (April 2006), New Delhi, India (April 2006), Geneva, Switzerland (May 2006), Bangkok, Thailand (May 2006), and Belo Horizonte, Brazil (May 2006).[5] The preliminary conclusions from the meetings had also been considered and endorsed by COMEST at its Extraordinary Session in June 2006 and Ordinary Session in Dakar, Senegal (December 2006).

[5] A further consultation meeting was held in Cairo, Egypt, in October 2008. Consistently with the results of the 2006 process, the meeting was invited to consider not adoption of a new normative instrument but monitoring of the implementation of the 1974 Recommendation and its place within a general ethical framework to guide scientific activity.

Rather than development of a new normative instrument, UNESCO was therefore invited to work towards a general ethical framework to guide scientific activity on the basis of the Executive Board decision quoted in section 1. The existing normative instruments constitute an important component of this prospective ethical framework.

In parallel with promotion and monitoring of the implementation of the 1974 Recommendation, taking account of the 1999 Declaration, additional developments are envisaged.

The issue is less to develop *an* "ethical code of conduct for scientists" (in the singular) than to develop appropriate (plural) ethical standards and mechanisms for the regulation of scientific conduct with due regard to the diversity of (national, disciplinary, etc.) situations and to the fact that not all regulation is or should be within the competence of Member States. The emphasis on a participatory process involving scientific communities and other stakeholders follows directly from this requirement. One implication is that State-level monitoring of implementation would be inadequate if not supplemented by monitoring at a more general level of the multiple processes by which ethical principles for science are institutionalized. There is a place for regulation as for exhortation, for labour contracts as for professional standards, for national uniformity as for institutional specificity.

ETHICAL PRINCIPLES FOR SCIENTIFIC CONDUCT IN SPECIFIC AREAS

In addition to activities relating to science ethics in general, COMEST is also engaged in activities focused on ethical issues in specific areas, defined by particular issues (e.g. nano-ethics, environmental ethics) or specific notions (e.g. the precautionary principle).

Nanotechnologies are currently of particular concern in this respect. On the one hand, the field is still in its early stage of development and COMEST has the opportunity to be prospective and anticipatory in identifying ethical issues that may emerge. On the other hand, the impact of nanotechnologies is global. As industrial and commercial development proceeds, the focus is gradually moving from possible technological futures, with a view to better understanding of the scientific potential and possible societal impact of new developments, to the regulation of conduct in areas of science where cutting-edge agendas are already being pursued. Thus, to take just one interesting example, the European Commission Recommendation on a Code of Conduct for Responsible Nanosciences and Nanotechnologies Research[6] specifically calls upon research funding agencies to refrain from funding research in certain supposedly problematic areas and, explicitly or implicitly, calls upon "responsible" researchers to abstain from engaging in such research. This exemplifies the connection between ethical concerns about science and technology and science ethics in the strict sense.

In its previous phase, the work of COMEST emphasized state-of-the-art review and conceptual development, [7] awareness-raising [8] and reflection on policy implications. [9] Noting that the invisibility and rapid development of

[6] Adopted in February 2008. EC Document C(2008) 424 final.
[7] Henk T.A.M. ten Have (ed.), *Nanotechnologies, Ethics and Politics*. UNESCO Publishing, 2007.
[8] *Ethics and Politics of Nanotechnology*. UNESCO, 2006.
[9] *Nanotechnologies and Ethics: Policies and Actions*. UNESCO, 2007.

nanotechnologies, their possible military and security uses and global impact, and the risk of a "nano-divide" between the developing and developed countries, give rise to specific ethical concerns, COMEST pointed to four areas of action: articulating an ethical framework, awareness raising, ethics education, and research and development policies. Nanotechnologies should be regarded, in this respect, not as a *sui generis* area calling for development of an *ad hoc* ethical framework, but rather as one set of issues to which a general ethical framework to guide scientific activity needs to apply. Conversely, science ethics principles developed to address specific features of nanotechnologies should be considered as *prima facie* applicable to other areas with similar background features.

The current work of COMEST focuses on achieving take-up of the 2007 policy recommendations both at the policy level and within academic and scientific communities. Scientific conduct is by no means the only issue in this regard, but it is one important dimension of the ongoing ethical conversation.[10]

RESEARCH INTEGRITY

The existing normative framework for science ethics takes it for granted that the integrity of science is a condition for it to contribute to human wellbeing, and therefore also a condition for scientists to enjoy the status accorded to them by the 1974 Recommendation. The fact that integrity may be violated – and indeed that current conditions may make violations more likely – is well identified (see sections 2.2 and 2.3). A full response to this challenge needs to combine education, training and awareness-raising with effective procedures to detect, investigate and punish serious cases of scientific misconduct. Current work focuses on the latter objective.

In the framework of the OECD Global Science Forum, UNESCO is contributing to global reflection on misconduct in international research and on the institutional mechanisms that might facilitate effective prevention, detection and investigation of falsification, fabrication and plagiarism. Work in this area responds to two related integrity concerns: first that international research cooperation makes it easier for research misconduct to pass unnoticed, even when adequate mechanisms exist at the national level; and secondly that the context of international research, including new commercial and/or security pressures on institutions and individuals, makes research misconduct more likely to occur, as indeed may also be the case at national level. The work of the OECD Global Science Forum is preparatory, inter alia, to the Second World Congress on Scientific Integrity, currently planned for 2010. Parallel work is under way, again with UNESCO participation and with many of the same stakeholders, in the context of the European Science Foundation Member Forum.

GLOBAL ETHICS OBSERVATORY

Efforts continue to collect and survey codes of scientific conduct produced by bodies or institutions, whether public or private, with relevant mandates. The objective of the survey is to develop more systematic knowledge about the kinds of instruments that are judged most appropriate for specific circumstances and to

[10] Among specific activities, it should be noted that COMEST has been closely involved with UNESCO activities on ethics of nanotechnologies in the Arab region. An international expert meeting held in Doha, Qatar, in May 2009, led to a consensus that a declaration on the ethics of nanotechnologies would be valuable, certainly at regional and possibly at international level, and that UNESCO, with the advice of COMEST, should start work towards such a declaration.

make a strong knowledge base available through the online Global Ethics Observatory (GEObs) to all interested stakeholders.

BIOSECURITY

Scientific and technological transformations within the life sciences, along with new concerns about the use of biological knowledge and technologies, have stimulated major international interest in “biosecurity”, one component of which is the perceived importance of appropriate forms of regulation of scientific conduct and of the circulation of scientific information. At the invitation of the World Health Organization, of the Biological Weapons Convention, and of national partners such as the US National Academies of Science, UNESCO has been actively involved in preliminary discussion about identification of issues and of steps that might be required.

THE HUMAN RIGHT TO SHARE IN SCIENTIFIC ADVANCEMENT AND ITS BENEFITS

Among the human rights within UNESCO’s competence, emphasis is currently being put on the underdeveloped right “to share in scientific advancement and its benefits”, of which the ethical corollary is the obligations incumbent on scientists to ensure that their work serves the universal benefit of mankind and to make it available to appropriate audiences in relevant ways.

Recommendations [PRELIMINARY PROPOSALS FROM WORKING GROUP]

MONITORING OF IMPLEMENTATION OF THE 1974 RECOMMENDATION

- The monitoring process should be designed so as to ensure integration of science ethics and science policy issues. It should also give Member States the opportunity to comment on the limitations of the Recommendation and the practical steps that might be taken to supplement it, *inter alia* through enhanced articulation with the 1999 Declaration.
- In addition to monitoring of national policies, consideration should be given to the impact of globalization, with particular reference to fair employment and non-employment conditions *across* and *within* national research systems.
- Particular attention should be given in analysis and follow-up of the monitoring process to global inequalities including brain drain and inequitable distribution of research funds.
- The role of public investment in research leading to public benefit should be promoted. Public-private partnerships, where relevant, should be equitable with regard to sharing of costs and benefits.

ACTION REQUIRED TO FOLLOW UP THE 1999 DECLARATION

[No specific proposals formulated to date.]

DEVELOPMENT OF ETHICAL CODES OF CONDUCT

- The ethical principles developed for States and other institutions in the existing normative framework should be extended in a coherent fashion to individual researchers and corporate scientists.
- Steps should be taken to establish cooperation with relevant national, regional and professional bodies in order to explore pluralistic options for development of a general ethical framework to guide ethical activity.
- Analysis of existing codes of conduct should proceed with a view to developing a knowledge base to inform discussion among relevant stakeholders at all appropriate levels.

OTHER DESIRABLE DEVELOPMENTS

- An initiative would be desirable to promote international collaboration aiming at improvement of benefit sharing, particularly directed at developing countries that currently have inadequate access to scientific and technological advances.
- UNESCO is invited to bring together scientific editors and publishers to consider issues of access to scientific information and publication-related misconduct, including not just falsification, fabrication and plagiarism, but also premature release of sometimes exaggerated results without adequate peer-review (whether for professional or commercial gain) and the availability of harmful information on the Internet. Collaboration with SciDev could be one practical step in this regard.
- A review should be conducted of intellectual property issues relevant to science ethics, with a view to assessing whether any gaps remain

to be filled that should be brought to the attention of the appropriate bodies.

- Coordination between COMEST and the International Bioethics Committee should be improved, particularly with regard to areas of overlap such as biotechnologies and technological convergence. The possibility of a joint meeting or joint working group should be considered.

FUTURE DIRECTIONS FOR COMEST WORK ON SCIENCE ETHICS

- COMEST should engage in reflection on the tools and practical modalities that might make it possible to establish a forum for interdisciplinary, multicultural and pluralistic reflection on new and emerging global issues, bringing together the intellectual and scientific communities, policy-makers, public and private stakeholders and actors of civil society.
- COMEST should seek to encourage dialogue on shared ethical principles between experts from diverse cultural, legal, philosophical and religious backgrounds.
- COMEST should engage in reflection on the application of the language of risk and uncertainty to scientific and technological issues that have been framed by the existing normative framework in terms of “dangers”, taking account of and extending its previous work on the precautionary principle, with the objective of clarifying the “vigilance” required of scientists with respect to possible misuse of science.
- COMEST should explore the relevance of a review of science ethics teaching.

End of Millennium

Second edition
With a new preface

Manuel Castells

WILEY-BLACKWELL
A John Wiley & Sons, Ltd., Publication

This second edition with a new preface first published 2010

Edition history: Blackwell Publishers (1e, 1998), Blackwell Publishers (2e, 2000)

Blackwell Publishing was acquired by John Wiley & Sons in February 2007. Blackwell's publishing program has been merged with Wiley's global Scientific, Technical, and Medical business to form Wiley-Blackwell.

Registered Office
John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, United Kingdom

Editorial Offices
350 Main Street, Malden, MA 02148-5020, USA
9600 Garsington Road, Oxford, OX4 2DQ, UK
The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK

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Library of Congress Cataloging-in-Publication Data is available for this title

ISBN: 978-1-4051-9688-8

A catalogue record for this book is available from the British Library.

Set in 10.5/12 Sabon by SPi Publisher Services Ltd, Pondicherry, India

Conclusion: Making Sense of our World

This means to say that scarcely
have we landed into life
than we come as if new-born;
let us not fill our mouths
with so many faltering names,
with so many sad formalities,
with so many pompous letters,
with so much of yours and mine,
with so much signing of papers.

I have in mind to confuse things,
unite them, make them new-born,
mix them up, undress them,
until all light in the world
has the oneness of the ocean,
a generous, vast wholeness,
a crackling, living fragrance.

Pablo Neruda, fragment of "Too Many Names," *Estravagario*

This is the general conclusion of the three-volume book, *The Information Age: Economy, Society, and Culture*. I have tried to avoid repetition. For definition of theoretical concepts used in this conclusion (for example, informationalism, or relationships of production), please refer to the Prologue of the book in volume I. See also the conclusion of volume I for an elaboration of the concept of network society, and the conclusion of volume II for an analysis of the relationships between cultural identity, social movements, and politics.

Genesis of a New World[1]

A new world is taking shape at this turn of the millennium. It originated in the historical coincidence, around the late 1960s and mid-1970s, of three *independent* processes: the information technology revolution; the economic crisis of both capitalism and statism, and their subsequent restructuring; and the blooming of cultural social movements, such as libertarianism, human rights, feminism, and environmentalism. The interaction between these processes, and the reactions they triggered, brought into being a new dominant social structure, the network society; a new economy, the informational /global economy; and a new culture, the culture of real virtuality. The logic embedded in this economy, this society, and this culture underlies social action and institutions throughout an interdependent world.

A few, decisive features of this new world have been identified in the investigation presented in the three volumes of this book. The information technology revolution induced the emergence of informationalism, as the material foundation of a new society. Under informationalism, the generation of wealth, the exercise of power, and the creation of cultural codes came to depend on the technological capacity of societies and individuals, with information technology as the core of this capacity. Information technology became the indispensable tool for the effective implementation of processes of socioeconomic restructuring. Particularly important was its role in allowing the development of networking as a dynamic, self-expanding form of

1 In discussions in my seminars in recent years a recurrent question comes up so often that I think it would be useful to take it to the reader. It is the question of newness. What is new about all this? Why is this a new world? I do believe that there is a new world emerging at this turn of millennium. In the three volumes of this book I have tried to provide information and ideas in support of this statement. Chips and computers are new; ubiquitous, mobile telecommunications are new; genetic engineering is new; electronically integrated, global financial markets working in real time are new; an inter-linked capitalist economy embracing the whole planet, and not only some of its segments, is new; a majority of the urban labor force in knowledge and information processing in advanced economies is new; a majority of urban population in the planet is new; the demise of the Soviet Empire, the fading away of communism, and the end of the Cold War are new; the rise of the Asian Pacific as an equal partner in the global economy is new; the widespread challenge to patriarchalism is new; the universal consciousness on ecological preservation is new; and the emergence of a network society, based on a space of flows, and on timeless time, is historically new. *Yet this is not the point I want to make*. My main statement is that it does not really matter if you believe that this world, or any of its features, is new or not. My analysis stands by itself. This is our world, the world of the Information Age. And this is my analysis of this world, which must be understood, used, judged, by itself, by its capacity, or incapacity, to identify and explain the phenomena that we observe and experience, regardless of its newness. After all, if nothing is new under the sun, why bother to try to investigate, think, write, and read about it?

organization of human activity. This prevailing, networking logic transforms all domains of social and economic life.

The crisis of models of economic development for both capitalism and statism prompted their parallel restructuring from the mid-1970s onwards. In capitalist economies, firms and governments proceeded with a number of measures and policies that, together, led to a new form of capitalism. It is characterized by globalization of core economic activities, organizational flexibility, and greater power for management in its relation to labor. Competitive pressures, flexibility of work, and weakening of organized labor led to the retrenchment of the welfare state, the cornerstone of the social contract in the industrial era. New information technologies played a decisive role in facilitating the emergence of this rejuvenated, flexible capitalism, by providing the tools for networking, distant communication, storing/processing of information, coordinated individualization of work, and simultaneous concentration and decentralization of decision-making.

In this global, interdependent economy, new competitors, firms and countries came to claim an increasing share of production, trade, capital, and labor. The emergence of a powerful, competitive Pacific economy, and the new processes of industrialization and market expansion in various areas of the world, regardless of recurrent crises and systemic instability, broadened the scope and scale of the global economy, establishing a multicultural foundation of economic interdependence. Networks of capital, labor, information, and markets linked up, through technology, valuable functions, people, and localities around the world, while switching off from their networks those populations and territories deprived of value and interest for the dynamics of global capitalism. There followed the social exclusion and economic irrelevance of segments of societies, of areas of cities, of regions, and of entire countries, constituting what I call the "Fourth World." The desperate attempt by some of these social groups and territories to link up with the global economy, to escape marginality, led to what I call the "perverse connection," when organized crime around the world took advantage of their plight to foster the development of a global criminal economy. It aims at satisfying forbidden desire and supplying outlawed commodities to endless demand from affluent societies and individuals.

The restructuring of statism proved to be more difficult, particularly for the dominant statist society in the world, the Soviet Union, at the center of a broad network of statist countries and parties. Soviet statism proved incapable of assimilating informationalism, thus stalling economic growth and decisively weakening its military machine,

the ultimate source of power in a statist regime. Their awareness of stagnation and decline led some Soviet leaders, from Andropov to Gorbachev, to attempt a restructuring of the system. In order to overcome inertia and resistance from the party/state, reformist leadership opened up information and called upon civil society for support. The powerful expression of national/cultural identities, and the people's demands for democracy, could not be easily channeled into a prescripted reform program. The pressure of events, tactical errors, political incompetence, and the internal split of statist apparatuses led to the sudden collapse of Soviet Communism, in one of the most extraordinary events in political history. With it, the Soviet Empire crumbled also, while statist regimes in its global area of influence were decisively weakened. So ended, in what amounted to an instant by historical standards, the revolutionary experiment that dominated the twentieth century. This was also the end of the Cold War between capitalism and statism, which had divided the world, determined geopolitics, and haunted our lives for the past half-century.

In its communist incarnation, statism ended there, for all practical purposes, although China's brand of statism took a more complicated, subtle way toward its historical exit, as I tried to show in chapter 4 of this volume. For the sake of the coherence of the argument presented here, let me remind the reader that the Chinese state at the turn of the millennium, while fully controlled by the Communist party, is organized around China's incorporation into global capitalism, on the basis of a nationalist project represented by the state. This Chinese nationalism with socialist characteristics is quickly moving away from statism into global capitalism, while trying to find a way to adapt to informationalism, without an open society.

After the demise of statism as a system, capitalism thrives throughout the world, and it deepens its penetration of countries, cultures, and domains of life. In spite of a highly diversified social and cultural landscape, for the first time in history the whole planet is organized around a largely common set of economic rules. It is, however, a different kind of capitalism from the one formed during the Industrial Revolution, or the one that emerged from the 1930s Depression and World War II, under the form of economic Keynesianism and social welfarism. It is a hardened form of capitalism in its goals, but is incomparably more flexible than any of its predecessors in its means. It is informational capitalism, relying on innovation-induced productivity and globalization-oriented competitiveness to generate wealth, and to appropriate it selectively. It is, more than ever, embedded in culture and tooled by technology. But, this time, both culture and technology depend on the ability of knowledge and information

to act upon knowledge and information, in a recurrent network of globally connected exchanges.

Societies, however, are not just the result of technological and economic transformation, nor can social change be limited to institutional crises and adaptations. At about the same time that these developments started to take place in the late 1960s, powerful social movements exploded almost simultaneously all over the industrialized world, first in the United States and France, then in Italy, Germany, Spain, Japan, Brazil, Mexico, Czechoslovakia, with echoes and reactions in numerous other countries. As a participant in these social movements (I was an assistant professor of sociology at the Nanterre campus of the University of Paris in 1968), I bear witness to their libertarianism. While they often adopted Marxist ideological expressions in their militant vanguards, they had little to do with Marxism or, for that matter, with the working class. They were essentially cultural movements, wanting to change life rather than seizing power. They intuitively knew that access to the institutions of state co-opts the movement, while the construction of a new, revolutionary state perverts the movement. Their ambitions encompassed a multidimensional reaction to arbitrary authority, a revolt against injustice, and a search for personal experimentation. While often enacted by students, they were not by any means student movements, since they permeated throughout society, particularly among young people, and their values reverberated in all spheres of life. Of course, they were politically defeated because, as most utopian movements in history, they never pretended to political victory. But they faded away with high historical productivity, with many of their ideas, and some of their dreams, germinating in societies and blossoming as cultural innovations, to which politicians and ideologues will have to relate for generations to come. From these movements sprang the ideas that would be the source of environmentalism, of feminism, of the endless defense of human rights, of sexual liberation, of ethnic equality, and of grassroots democracy. The cultural movements of the 1960s and early 1970s, in their affirmation of individual autonomy against both capital and the state, placed a renewed stress on the politics of identity. These ideas paved the way for the building of cultural communes in the 1990s, when the legitimacy crisis of institutions of the industrial era blurred the meaning of democratic politics.

The social movements were not reactions to the economic crisis. Indeed, they surged in the late 1960s, in the heyday of sustained growth and full employment, as a critique of the "consumption society." While they induced some workers' strikes, as in France, and helped the political left, as in Italy, they were not a part of the

right/left politics of the industrial era that had been organized around the class cleavages of capitalism. And while they coexisted, broadly speaking, with the information technology revolution, technology was largely absent from either the values or critiques of most movements, if we except some calls against de-humanizing machinism, and their opposition to nuclear power (an old technology in the Information Age). But if these social movements were primarily cultural, and independent of economic and technological transformations, they did have an impact on economy, technology, and ensuing restructuring processes. Their libertarian spirit considerably influenced the movement toward individualized, decentralized uses of technology. Their sharp separation from traditional labor politics contributed to the weakening of organized labor, thus facilitating capitalist restructuring. Their cultural openness stimulated technological experimentation with symbol manipulation, constituting a new world of imaginary representations that would evolve toward the culture of real virtuality. Their cosmopolitanism, and internationalism, set up the intellectual bases for an interdependent world. And their abhorrence of the state undermined the legitimacy of democratic rituals, in spite of the fact that some leaders of the movement went on to renew political institutions. Moreover, by refusing the orderly transmission of eternal codes and established values, such as patriarchalism, religious traditionalism, and nationalism, the 1960s' movements set the stage for a fundamental split in societies all over the world: on the one hand, active, culturally self-defined elites, constructing their own values on the basis of their experience; on the other hand, increasingly uncertain, insecure social groups, deprived of information, resources, and power, digging their trenches of resistance precisely around those eternal values that had been decried by the rebellious 1960s.

The revolution of technology, the restructuring of economy, and the critique of culture converged toward a historical redefinition of the relationships of production, power, and experience, on which societies are based.

A New Society

A new society emerges when and if a structural transformation can be observed in the relationships of production, in the relationships of power, and in the relationships of experience. These transformations lead to an equally substantial modification of social forms of space and time, and to the emergence of a new culture.

Information and analyses presented in the three volumes of this book provide a strong indication of such a multidimensional transformation in the last lapse of the second millennium. I shall synthesize the main features of transformation for each dimension, referring the reader to the respective chapters covering each subject for empirical materials that lend some credibility to the conclusions presented here.

Relationships of production have been transformed, both socially and technically. To be sure, they are capitalist, but of a historically different brand of capitalism, which I call informational capitalism. For the sake of clarity, I shall consider, in sequence, the new characteristics of the production process, of labor, and of capital. Then, the transformation of class relationships can be made visible.

Productivity and competitiveness are the commanding processes of the informational/global economy. Productivity essentially stems from innovation, competitiveness from flexibility. Thus, firms, regions, countries, economic units of all kinds, gear their production relationships to maximize innovation and flexibility. Information technology, and the cultural capacity to use it, are essential in the performance of the new production function. In addition, a new kind of organization and management, aiming at simultaneous adaptability and coordination, becomes the basis for the most effective operating system, exemplified by what I label the network enterprise.

Under this new system of production, labor is redefined in its role as producer, and sharply differentiated according to workers' characteristics. A major difference refers to what I call generic labor versus self-programmable labor. The critical quality in differentiating these two kinds of labor is education, and the capacity of accessing higher levels of education; that is, embodied knowledge and information. The concept of education must be distinguished from skills. Skills can be quickly made obsolete by technological and organizational change. Education (as distinct from the warehousing of children and students) is the process by which people, that is labor, acquire the capability constantly to redefine the necessary skills for a given task, and to access the sources for learning these skills. Whoever is educated, in the proper organizational environment, can reprogram him/herself toward the endlessly changing tasks of the production process. On the other hand, generic labor is assigned a given task, with no reprogramming capability, and it does not presuppose the embodiment of information and knowledge beyond the ability to receive and execute signals. These "human terminals" can, of course, be replaced by machines, or by any other body around the city, the country, or the world, depending on business decisions. While they are collectively indispensable to the production process, they are individually

expendable, as value added by each one of them is a small fraction of what is generated by and for the organization. Machines, and generic labor from various origins and locations, cohabit the same subservient circuits of the production system.

Flexibility, enacted organizationally by the network enterprise, requires networkers, and flextimers, as well as a wide array of working arrangements, including self-employment and reciprocal subcontracting. The variable geometry of these working arrangements leads to the coordinated decentralization of work and to the individualization of labor.

The informational/global economy is capitalist; in fact, more so than any other economy in history. But capital is as transformed as labor is in this new economy. The rule is still production for the sake of profit, and for the private appropriation of profit, on the basis of property rights – which is the essence of capitalism. But how does this appropriation of profit take place? Who are the capitalists? Three different levels must be considered in answering this fundamental question. Only the third level is specific to informational capitalism.

The first level concerns *the holders of property rights*. These are, basically, of three kinds: (a) shareholders of companies, a group in which institutional, anonymous shareholders are increasingly predominant and whose investment and disinvestment decisions are often governed solely by short-term financial considerations; (b) family owners, still a relevant form of capitalism, particularly in the Asian Pacific; and (c) individual entrepreneurs, owners of their own means of production (their minds being their main asset), risk-takers, and proprietors of their own profit-making. This last category, which was fundamental to the origins of industrial capitalism and then became largely phased out by corporate industrialism, has made a remarkable comeback under informational capitalism, using the pre-eminence of innovation and flexibility as the essential features of the new production system.

The second level of capitalist forms refers to *the managerial class*; that is, the controllers of capital assets on behalf of shareholders. These managers, whose pre-eminence Berle and Means had already shown in the 1930s, still constitute the heart of capitalism under informationalism, particularly in multinational corporations. I see no reason not to include among them managers of state-owned companies who, for all practical purposes, follow the same logic, and share the same culture, minus the risk for losses underwritten by the taxpayer.

The third level in the process of appropriation of profits by capital is both an old story and a fundamental feature of the new

informational capitalism. The reason lies in the nature of *global financial markets*. It is in these markets that profits from all sources ultimately converge in search of higher profits. Indeed, the margins of gain in the stock market, in the bond market, in the currency market, in futures, options, and derivatives, in financial markets at large, are, on average, considerably greater than in most direct investments, excepting a few instances of speculation. This is so not because of the nature of financial capital, the oldest form of capital in history. But because of the technological conditions under which it operates in informationalism. Namely its annihilation of space and time by electronic means. Its technological and informational ability relentlessly to scan the entire planet for investment opportunities, and to move from one option to another in a matter of seconds, brings capital into constant movement, merging in this movement capital from all origins, as in mutual funds investments. The programming and forecasting capabilities of financial management models make it possible to colonize the future, and the interstices of the future (that is, possible alternative scenarios), selling this "unreal estate" as property rights of the immaterial. Played by the rules, there is nothing evil about this global casino. After all, if cautious management and proper technology avoid dramatic crushes of the market, the losses of some fractions of capital are the wins of others, so that, over the long term, the market balances out and keeps a dynamic equilibrium. However, because of the differential between the amount of profits obtained from the production of goods and services, and the amount that can be obtained from financial investments, individual capitals of all kinds are, in fact, dependent on the fate of their investments in global financial markets, since capital can never remain idle. Thus, *global financial markets, and their networks of management, are the actual collective capitalist, the mother of all accumulations*. To say so is not to say that financial capital dominates industrial capital, an old dichotomy that simply does not fit the new economic reality. Indeed, in the past quarter of a century, firms around the world have, by and large, self-financed the majority of their investments with the proceeds of their trade. Banks do not control manufacturing firms, nor do they control themselves. Firms of all kinds, financial producers, manufacturing producers, agricultural producers, service producers, as well as governments and public institutions, use global financial networks as the depositories of their earnings and as their potential source of higher profits. It is in this specific form that *global financial networks are the nerve center of informational capitalism*. Their movements determine the value of stocks, bonds, and currencies, bringing doom or bonanza to savers, investors, firms, and countries.

But these movements do not follow a market logic. The market is twisted, manipulated, and transformed, by a combination of computer-enacted strategic maneuvers, crowd psychology from multicultural sources, and unexpected turbulences, caused by greater and greater degrees of complexity in the interaction between capital flows on a global scale. While cutting-edge economists are trying to model this market behavior on the basis of game theory, their heroic efforts to find rational expectation patterns are immediately downloaded in the computers of financial wizards to obtain new competitive advantage from this knowledge by innovating on already known patterns of investment.

The consequences of these developments on *social class relationships* are as profound as they are complex. But before identifying them I need to distinguish between different meanings of class relationships. One approach focuses on social inequality in income and social status, along the lines of social stratification theory. From this perspective, the new system is characterized by *a tendency to increased social inequality and polarization*, namely the simultaneous growth of both the top and the bottom of the social scale. This results from three features: (a) a fundamental differentiation between self-programmable, highly productive labor, and generic, expendable labor; (b) the individualization of labor, which undermines its collective organization, thus abandoning the weakest sections of the workforce to their fate; and (c) under the impact of individualization of labor, globalization of economy, and delegitimation of the state, the gradual demise of the welfare state, so removing the safety net for people who cannot be individually well off. This tendency toward inequality and polarization is certainly not inexorable: it can be countered and prevented by deliberate public policies. But inequality and polarization are prescripted in the dynamics of informational capitalism, and will prevail unless conscious action is taken to countervail these tendencies.

A second meaning of class relationships refers to *social exclusion*. By this I mean the de-linking between people-as-people and people-as-workers/consumers in the dynamics of informational capitalism on a global scale. In chapter 2 of this volume, I tried to show the causes and consequences of this trend in a variety of situations. Under the new system of production, a considerable number of humans, probably in a growing proportion, are irrelevant, both as producers and consumers, from the perspective of the system's logic. I must emphasize, again, that this is not the same as saying that there is, or will be, mass unemployment. Comparative data show that, by and large, in all urban societies, most people and/or their families work for pay, even

in poor neighborhoods and in poor countries. The question is: what kind of work for what kind of pay under what conditions? What is happening is that the mass of generic labor circulates in a variety of jobs, increasingly occasional jobs, with a great deal of discontinuity. So, millions of people are constantly in and out of paid work, often included in informal activities, and, in sizeable numbers, on the shop floor of the criminal economy. Furthermore, the loss of a stable relationship to employment, and the weak bargaining power of many workers, lead to a higher level of incidence of major crises in the life of their families: temporary job loss, personal crises, illness, drugs/alcohol addictions, loss of employability, loss of assets, loss of credit. Many of these crises connect with each other, inducing the downward spiral of social exclusion, toward what I have called the "black holes of informational capitalism," from which, statistically speaking, it is difficult to escape.

The borderline between social exclusion and daily survival is increasingly blurred for a growing number of people in all societies. Having lost much of the safety net, particularly for the new generations of the post-welfare state era, people who cannot follow the constant updating of skills, and fall behind in the competitive race, position themselves for the next round of "downsizing" of that shrinking middle that made the strength of advanced capitalist societies during the industrial era. Thus, processes of social exclusion do not only affect the "truly disadvantaged," but those individuals and social categories who build their lives on a constant struggle to escape falling down to a stigmatized underworld of downgraded labor and socially disabled people.

A third way of understanding new class relationships, this time in the Marxian tradition, is concerned with *who the producers are and who appropriates the products of their labor.* If innovation is the main source of productivity, knowledge and information are the essential materials of the new production process, and education is the key quality of labor, the new producers of informational capitalism are those knowledge generators and information processors whose contribution is most valuable to the firm, the region, and the national economy. But innovation does not happen in isolation. It is part of a system in which management of organizations, processing of knowledge and information, and production of goods and services are intertwined. So defined, this category of informational producers includes a very large group of managers, professionals, and technicians, who form a "collective worker"; that is, a producer unit made up of cooperation between a variety of inseparable individual workers. In OECD countries they may account for about one-third of the

employed population. Most other workers may be in the category of generic labor, potentially replaceable by machines or by other members of the generic labor force. They need the producers to protect their bargaining power. But informational producers do not need them: this is a fundamental cleavage in informational capitalism, leading to the gradual dissolution of the remnants of class solidarity of the industrial society.

But who appropriates a share of informational producers' work? In one sense, nothing has changed *vis-à-vis* classic capitalism: their employers do; this is why they employ them in the first place. But, on the other hand, the mechanism of appropriation of surplus is far more complicated. First, employment relationships are tendentially individualized, meaning that each producer will receive a different deal. Secondly, an increasing proportion of producers control their own work process, and enter into specific, horizontal working relationships, so that, to a large extent, they become independent producers, submitted to market forces, but playing market strategies. Thirdly, their earnings often go into the whirlwind of global financial markets, fed precisely by the affluent section of the global population, so that they are also collective owners of collective capital, thus becoming dependent on the performance of capital markets. Under these conditions, we can hardly consider that there is a class contradiction between these networks of highly individualized producers and the collective capitalist of global financial networks. To be sure, there is frequent abuse and exploitation of individual producers, as well as of large masses of generic labor, by whoever is in charge of production processes. Yet, segmentation of labor, individualization of work, and diffusion of capital in the circuits of global finance have jointly induced the gradual fading away of the class structure of the industrial society. There are, and will be, powerful social conflicts, some of them enacted by workers and organized labor, from Korea to Spain. Yet, they are not the expression of class struggle but of interest groups' demands and/or of revolt against injustice.

The *truly fundamental social cleavages of the Information Age* are: first, the internal fragmentation of labor between informational producers and replaceable generic labor. Secondly, the social exclusion of a significant segment of society made up of discarded individuals whose value as workers/consumers is used up, and whose relevance as people is ignored. And, thirdly, the separation between the market logic of global networks of capital flows and the human experience of workers' lives.

Power relations are being transformed as well by the social processes that I have identified and analyzed in this book. The main

transformation concerns the *crisis of the nation-state as a sovereign entity, and the related crisis of political democracy*, as constructed in the past two centuries. Since commands from the state cannot be fully enforced, and since some of its fundamental promises, embodied in the welfare state, cannot be kept, both its authority and its legitimacy are called into question. Because representative democracy is predicated on the notion of a sovereign body, the blurring of boundaries of sovereignty leads to uncertainty in the process of delegation of people's will. Globalization of capital, multilateralization of power institutions, and decentralization of authority to regional and local governments induce a new geometry of power, perhaps inducing a new form of state, the network state. Social actors, and citizens at large, maximize the chances of representation of their interests and values by playing out strategies in the networks of relationships between various institutions, at various levels of competence. Citizens of a given European region will have a better chance of defending their interests if they support their regional authorities against their national government, in alliance with the European Union. Or the other way around. Or else, none of the above; that is, by affirming local/regional autonomy against both the nation-state and supranational institutions. American malcontents may revile the federal government on behalf of the American nation. Or new Chinese business elites may push their interests by linking up with their provincial government, or with the still powerful national government, or with overseas Chinese networks. In other words, the new structure of power is dominated by a network geometry, in which power relationships are always specific to a given configuration of actors and institutions.

Under such conditions, informational politics, enacted primarily by symbol manipulation in the space of the media, fits well with this constantly changing world of power relationships. Strategic games, customized representation, and personalized leadership substitute for class constituencies, ideological mobilization, and party control, which were characteristic of politics in the industrial era.

As politics becomes a theater, and political institutions are bargaining agencies rather than sites of power, citizens around the world react defensively, voting to prevent harm from the state in place of entrusting it with their will. In a certain sense, *the political system is voided of power*, albeit not of influence.

Power, however, does not disappear. In an informational society, *it becomes inscribed, at a fundamental level, in the cultural codes through which people and institutions represent life and make decisions, including political decisions*. In a sense, power, while real,

becomes immaterial. It is real because wherever and whenever it consolidates, it provides, for a time, individuals and organizations with the capacity to enforce their decisions regardless of consensus. But it is immaterial because such a capacity derives from the ability to frame life experience under categories that predispose to a given behavior and can then be presented as to favor a given leadership. For instance, if a population feels threatened by unidentifiable, multidimensional fear, the framing of such fears under the codes of immigration = race = poverty = welfare = crime = job loss = taxes = threat, provides an identifiable target, defines an US versus THEM, and favors those leaders who are most credible in supporting what is perceived to be a reasonable dose of racism and xenophobia. Or, in a very different example, if people equate quality of life with conservation of nature, and with their spiritual serenity, new political actors could emerge and new public policies could be implemented.

Cultural battles are the power battles of the Information Age. They are primarily fought in and by the media, but the media are not the power-holders. Power, as the capacity to impose behavior, lies in the networks of information exchange and symbol manipulation, which relate social actors, institutions, and cultural movements, through icons, spokespersons, and intellectual amplifiers. In the long run, it does not really matter who is in power because the distribution of political roles becomes widespread and rotating. There are no more stable power elites. There are however, *elites from power*; that is, elites formed during their usually brief power tenure, in which they take advantage of their privileged political position to gain a more permanent access to material resources and social connections. Culture as the source of power, and power as the source of capital, underlie the new social hierarchy of the Information Age.

The transformation of *relationships of experience* revolves primarily around *the crisis of patriarchalism*, at the root of a profound redefinition of family, gender relationships, sexuality, and, thus, personality. Both for structural reasons (linked to the informational economy), and because of the impact of social movements (feminism, women's struggles, and sexual liberation), patriarchal authority is challenged in most of the world, albeit under various forms and intensity depending upon cultural/institutional contexts. The future of the family is uncertain, but the future of patriarchalism is not: it can only survive under the protection of authoritarian states and religious fundamentalism. As the studies presented in volume II, chapter 4 show, in open societies the patriarchal family is in deep crisis, while new embryos of egalitarian families are still struggling against the old world of interests, prejudices, and fears. Networks of

people (particularly for women) increasingly substitute for nuclear families as primary forms of emotional and material support. Individuals and their children follow a pattern of sequential family, and non-family, personal arrangements throughout their lives. And while there is a rapidly growing trend of fathers' involvement with their children, women – whether single or living with each other – and their children, are an increasingly prevalent form of reproduction of society, thus fundamentally modifying patterns of socialization. Admittedly, I am taking as my main point of reference the experience of the United States, and of most of Western Europe (with southern Europe being, to some extent, an exception in the European context). Yet, as I argued in volume II, it can be shown that women's struggles, whether or not avowedly feminist, are spreading throughout the world, thus undermining patriarchalism in the family, in the economy, and in the institutions of society. I consider it very likely that, with the spread of women's struggles, and with women's increasing awareness of their oppression, their collective challenge to the patriarchal order will generalize, inducing processes of crisis in traditional family structures. I do see signs of a recomposition of the family, as millions of men appear to be ready to give up their privileges and work together with women to find new forms of loving, sharing, and having children. Indeed, I believe that rebuilding families under egalitarian forms is the necessary foundation for rebuilding society from the bottom up. Families are more than ever the providers of psychological security and material well-being to people, in a world characterized by individualization of work, destructuring of civil society, and delegitimation of the state. Yet the transition to new forms of family implies a fundamental redefinition of gender relationships in society at large, and thus of sexuality. Because personality systems are shaped by family and sexuality, they are also in a state of flux. I characterized such a state as flexible personalities, able to engage endlessly in the reconstruction of the self, rather than to define the self through adaptation to what were once conventional social roles, which are no longer viable and which have thus ceased to make sense. *The most fundamental transformation of relationships of experience in the Information Age is their transition to a pattern of social interaction constructed, primarily, by the actual experience of the relationship*. Nowadays, people produce forms of sociability, rather than follow models of behavior.

Changes in relationships of production, power, and experience converge toward *the transformation of material foundations of social life, space, and time*. The space of flows of the Information Age dominates the space of places of people's cultures. Timeless time as

the social tendency toward the annihilation of time by technology supersedes the clock time logic of the industrial era. Capital circulates, power rules, and electronic communication swirls through flows of exchanges between selected, distant locales, while fragmented experience remains confined to places. Technology compresses time to a few, random instants, thus de-sequencing society, and de-historicizing history. By secluding power in the space of flows, allowing capital to escape from time, and dissolving history in the culture of the ephemeral, the network society disembodies social relationships, introducing the culture of real virtuality. Let me explain.

Throughout history, cultures have been generated by people sharing space and time, under conditions determined by relationships of production, power, and experience, and modified by their projects, fighting each other to impose over society their values and goals. Thus, spatio-temporal configurations were critical for the meaning of each culture, and for their differential evolution. Under the informational paradigm, a new culture has emerged from the superseding of places and the annihilation of time by the space of flows and by timeless time: *the culture of real virtuality.* As presented in volume I, chapter 5, by real virtuality I mean a system in which reality itself (that is, people's material/symbolic existence) is fully immersed in a virtual image setting, in the world of make believe, in which symbols are not just metaphors, but comprise the actual experience. This is not the consequence of electronic media, although they are the indispensable instruments of expression in the new culture. The material basis that explains why real virtuality is able to take over people's imagination and systems of representation is their livelihood in the space of flows and in timeless time. On the one hand, dominant functions and values in society are organized in simultaneity without contiguity; that is, in flows of information that escape from the experience embodies in any locale. On the other hand, dominant values and interests are constructed without reference to either past or future, in the timeless landscape of computer networks and electronic media, where all expressions are either instantaneous, or without predictable sequencing. All expressions from all times and from all spaces are mixed in the same hypertext, constantly rearranged, and communicated at any time, anywhere, depending on the interests of senders and the moods of receivers. This virtuality is our reality because it is within the framework of these timeless, placeless, symbolic systems that we construct the categories, and evoke the images, that shape behavior, induce politics, nurture dreams, and trigger nightmares.

This is the new social structure of the Information Age, which I call *the network society* because it is made up of networks of production,

power, and experience, which construct a culture of virtuality in the global flows that transcend time and space. Not all dimensions and institutions of society follow the logic of the network society, in the same way that industrial societies included for a long time many pre-industrial forms of human existence. But all societies in the Information Age are indeed penetrated, with different intensity, by the pervasive logic of the network society, whose dynamic expansion gradually absorbs and subdues pre-existing social forms.

The network society, as any other social structure, is not absent of contradictions, social conflicts, and challenges from alternative forms of social organization. But these challenges are induced by the characteristics of the network society, and, thus, they are sharply distinct from those of the industrial era. Accordingly, they are incarnated by different subjects, even though these subjects often work with historical materials provided by the values and organizations inherited from industrial capitalism and statism.

The understanding of our world requires the simultaneous analysis of the network society, and of its conflictive challenges. The historical law that where there is domination there is resistance continues to apply. But it requires an analytical effort to identify who the challengers are of the processes of domination enacted by the immaterial, yet powerful, flows of the network society.

The New Avenues of Social Change

According to observation, and as recorded in volume II, social challenges against patterns of domination in the network society generally take the form of constructing autonomous identities. These identities are external to the organizing principles of the network society. Against the worshipping of technology, the power of flows, and the logic of markets, they oppose their being, their beliefs, and their bequest. What is characteristic of social movements and cultural projects built around identities in the Information Age is that they do not originate within the institutions of civil society. They introduce, from the outset, an alternative social logic, distinct from the principles of performance around which dominant institutions of society are built. In the industrial era, the labor movement fought fiercely against capital. Capital and labor had, however, shared the goals and values of industrialization – productivity and material progress – each seeking to control its development and for a larger share of its harvest. In the end they reached a social pact. In the Information Age, the prevailing logic of dominant, global networks is so pervasive and so penetrating that the only way

out of their domination appears to be out of these networks, and to reconstruct meaning on the basis of an entirely distinct system of values and beliefs. This is the case for communes of resistance identity I have identified. Religious fundamentalism does not reject technology, but puts it at the service of God's Law, to which all institutions and purposes must submit, without possible bargaining. Nationalism, localism, ethnic separatism, and cultural communes break up with society at large, and rebuild its institutions not from the bottom up, but from the inside out, the "who we are" versus those who do not belong.

Even proactive movements, which aim at transforming the overall pattern of social relationships among people, such as feminism, or among people and nature, such as environmentalism, start from the rejection of basic principles on which our societies are constructed: patriarchalism, productivism. Naturally, there are all kind of nuances in the practice of social movements, as I tried to make clear in volume II, but, quite fundamentally, their principles of self-definition, at the source of their existence, represent a break with institutionalized social logic. Should institutions of society, economy, and culture truly accept feminism and environmentalism, they would be essentially transformed. Using an old word, it would be a revolution.

The strength of identity-based social movements is their autonomy *vis-à-vis* the institutions of the state, the logic of capital, and the seduction of technology. It is hard to co-opt them, although certainly some of their participants may be co-opted. Even in defeat, their resistance and projects impact and change society, as I have been able to show in a number of selected cases, presented in volume II. Societies of the Information Age cannot be reduced to the structure and dynamics of the network society. Following my scanning of our world, it appears that our societies are constituted by the interaction between the "net" and the "self," between the network society and the power of identity.

Yet, the fundamental problem raised by processes of social change that are primarily external to the institutions and values of society, as it is, is that they may fragment rather than reconstitute society. Instead of transformed institutions, we would have communes of all sorts. Instead of social classes, we would witness the rise of tribes. And instead of conflictive interaction between the functions of the space of flows and the meaning of the space of places, we may observe the retrenchment of dominant global elites in immaterial palaces made out of communication networks and information flows. Meanwhile, people's experience would remain confined to multiple, segregated locales, subdued in their existence and fragmented in their consciousness. With no Winter Palace to be seized, outbursts of revolt may implode, transformed into everyday senseless violence.

The reconstruction of society's institutions by cultural social movements, bringing technology under the control of people's needs and desires, seems to require a long march from the communes built around resistance identity to the heights of new project identities, sprouting from the values nurtured in these communes.

Examples of such processes, as observed in contemporary social movements and politics, are the construction of new, egalitarian families; the widespread acceptance of the concept of sustainable development, building intergenerational solidarity into the new model of economic growth; and the universal mobilization in defense of human rights wherever the defense has to be taken up. For this transition to be undertaken, from resistance identity to project identity, a new politics will have to emerge. This will be a cultural politics that starts from the premise that informational politics is predominantly enacted in the space of media, and fights with symbols, yet connects to values and issues that spring from people's life experience in the Information Age.

Beyond this Millennium

Throughout the pages of this book I have adamantly refused to indulge in futurology, staying as close as possible to observation of what we know the Information Age brings to us, as constituted in the last lapse of the twentieth century. In concluding this book, however, with the reader's benevolence, I would like to elaborate, for the span of just a few paragraphs, on some trends that may configure society in the early twenty-first century. This is simply an attempt to bring a dynamic, prospective dimension to this synthesis of findings and hypotheses.

The information technology revolution will accentuate its transformative potential. The twenty-first century will be marked by the completion of a global information superhighway, and by mobile telecommunication and computing power, thus decentralizing and diffusing the power of information, delivering the promise of multimedia, and enhancing the joy of interactive communication. Electronic communication networks will constitute the backbone of our lives. In addition, it will be the century of the full flowering of the genetic revolution. For the first time, our species will penetrate the secrets of life, and will be able to perform substantial manipulations of living matter. While this will trigger a dramatic debate on the social and environmental consequences of this capacity, the possibilities open to us are truly extraordinary. Prudently used, the genetic revolution may

heal, fight pollution, improve life, and save time and effort from survival, so as to give us the chance to explore the largely unknown frontier of spirituality. Yet, if we make the same mistakes as we made in the twentieth century, using technology and industrialization to massacre each other in atrocious wars, with our new technological power we may well end life on the planet. It turned out to be relatively easy to stop short of nuclear holocaust because of the centralized control of nuclear energy and weaponry. But new genetic technologies are pervasive, their mutating impacts not fully controllable, and their institutional control much more decentralized. To prevent the evil effects of biological revolution we need not only responsible governments, but a responsible, educated society. Which way we go will depend on society's institutions, on people's values, and on the consciousness and determination of new social actors to shape and control their own destiny. Let me briefly review these prospects by pinpointing some major developments in the economy, polity, and culture.

The maturing of the informational economy, and the diffusion and proper use of information technology as a system, will likely unleash the productivity potential of this technological revolution. This will be made visible by changes in statistical accounting, when twentieth-century categories and procedures, already manifestly inadequate, will be replaced by new concepts able to measure the new economy. There is no question that the twenty-first century will witness the rise of an extraordinarily productive system by historical standards. Human labor will produce more and better with considerably less effort. Mental work will replace physical effort in the most productive sectors of the economy. However, the sharing of this wealth will depend for individuals on their access to education and, for society as a whole, on social organization, politics, and policies.

The global economy will expand in the twenty-first century, using substantial increases in the power of telecommunications and information processing. It will penetrate all countries, all territories, all cultures, all communication flows, and all financial networks, relentlessly scanning the planet for new opportunities for profit-making. But it will do so selectively, linking valuable segments and discarding used up, or irrelevant, locales and people. The territorial unevenness of production will result in an extraordinary geography of differential value-making that will sharply contrast countries, regions, and metropolitan areas. Valuable locales and people will be found everywhere, even in Sub-Saharan Africa, as I have argued in this volume. But switched-off territories and people will also be found everywhere, albeit in different proportions. The planet is being segmented into clearly distinct spaces, defined by different time regimes.

From the excluded segments of humankind, two different reactions can be expected. On the one hand, there will be a sharp increase in the operation of what I call the "perverse connection," that is, playing the game of global capitalism with different rules. The global criminal economy, whose profile and dynamics I tried to identify in chapter 3 of this volume, will be a fundamental feature of the twenty-first century, and its economic, political, and cultural influence will penetrate all spheres of life. The question is not whether our societies will be able to eliminate the criminal networks, but, rather, whether criminal networks will not end up controlling a substantial share of our economy, of our institutions, and of our everyday life.

There is another reaction against social exclusion and economic irrelevance that I am convinced will play an essential role in the twenty-first century: the exclusion of the excluders by the excluded. Because the whole world is, and will increasingly be, intertwined in the basic structures of life, under the logic of the network society, opting out by people and countries will not be a peaceful withdrawal. It takes, and it will take, the form of fundamentalist affirmation of an alternative set of values and principles of existence, under which no coexistence is possible with the evil system that so deeply damages people's lives. As I write, in the streets of Kabul women are beaten for improper dress by the courageous warriors of the Taliban. This is not in accordance with the humanistic teachings of Islam. There is however, as analyzed in volume II, an explosion of fundamentalist movements that take up the Qū'ran, the Bible, or any holy text, to interpret it and use it, as a banner of their despair and a weapon of their rage. Fundamentalisms of different kinds and from different sources will represent the most daring, uncompromising challenge to one-sided domination of informational, global capitalism. Their potential access to weapons of mass extermination casts a giant shadow on the optimistic prospects of the Information Age.

Nation-states will survive, but not so their sovereignty. They will band together in multilateral networks, with a variable geometry of commitments, responsibilities, alliances, and subordinations. The most notable multilateral construction will be the European Union, bringing together the technological and economic resources of most, but not all, European countries: Russia is likely to be left out, out of the West's historical fears, and Switzerland needs to be off limits to keep its job as the world's banker. But the European Union, for the time being, does not embody a historical project of building a European society. It is, essentially, a defensive construction on behalf of European civilization to avoid becoming an economic colony of Asians and Americans. European nation-states will remain and will

bargain endlessly for their individual interests within the framework of European institutions, which they will need but, in spite of their federalist rhetoric, neither Europeans nor their governments will cherish. Europe's unofficial anthem (Beethoven's "Hymn of Joy") is universal, but its German accent may become more marked.

The global economy will be governed by a set of multilateral institutions, networked among themselves. At the core of this network is the G7 countries club, perhaps with a few additional members, and its executive arms, the International Monetary Fund, and the World Bank, charged with regulation and intervention on behalf of the ground rules of global capitalism. Technocrats and bureaucrats of these, and similar, international economic institutions will add their own dose of neoliberal ideology and professional expertise in the implementation of their broad mandate. Informal gatherings, such as the Davos meetings, or their equivalents, will help to create the cultural/personal glue of the global elite.

Global geopolitics will also be managed by multilateralism, with the United Nations, and regional international institutions ASEAN, OEA, or OAU, playing an increasing role in the management of international or even national conflicts. They will increasingly use security alliances, such as NATO, in the enforcement of their decisions. When necessary, *ad hoc* international police forces will be created to intervene in trouble spots.

Global security matters will be likely to be dominated by three main issues, if the analyses contained in this book are proved correct. The first is the rising tension in the Pacific, as China asserts its global power, Japan goes into another round of national paranoia, and Korea, Indonesia, and India react to both. The second is the resurgence of Russian power, not only as a nuclear superpower, but as a stronger nation, no longer tolerating humiliation. The conditions under which post-Communist Russia will be or will not be brought into the multilateral system of global co-management will determine the future geometry of security alignments. The third security issue is probably the most decisive of all, and will be likely to condition safety for the world at large for a long period of time. It refers to the new forms of warfare that will be used by individuals, organizations, and states, strong in their convictions, weak in their military means, but able to access new technologies of destruction, as well as find the vulnerable spots of our societies. Criminal gangs may also resort to high-intensity confrontation when they see no other option, as Colombia experienced in the 1990s. Global or local terrorism is already considered a major threat worldwide at the turn of the millennium. But, I believe this is only a modest beginning. Increasing

technological sophistication leads to two trends converging toward outright terror: on the one hand, a small determined group, well financed, and well informed, can devastate entire cities, or strike at nerve centers of our livelihood; on the other hand, the infrastructure of our everyday life, from energy to transportation to water supply, has become so complex, and so intertwined, that its vulnerability has increased exponentially. While new technologies help security systems, they also make our daily life more exposed. The price for increased protection will be to live within a system of electronic locks, alarms systems, and on-line police patrols. It will also mean to grow up in fear. It is probably not different from the experience of most children in history. It is also a measure of the relativity of human progress.

Geopolitics will also be increasingly dominated by a fundamental contradiction between the multilateralism of decision-making and the unilateralism of military implementation of these decisions. This is because, after the demise of the Soviet Union, and the technological backwardness of the new Russia, the United States is, and will be for the foreseeable future, the only military superpower. Thus, most security decisions will have to be either implemented or supported by the United States to be truly effective or credible. The European Union, for all its arrogant talk, gave a clear demonstration of its operational inability to act alone in the Balkans. Japan has forbidden itself to build an army, and the pacifist feeling in the country runs deeper than the support for ultra-nationalist provocations. Outside the OECD, only China and India may have enough technological and military might to access global power in the foreseeable future, but certainly not to match the United States or even Russia. So, excepting the unlikely hypothesis of an extraordinary Chinese military build up, for which China simply does not yet have the technological capacity, the world is left with one superpower, the United States. Under such conditions, various security alliances will have to rely on American forces. But the US is confronted with such deep domestic social problems that it will certainly not have the means, nor the political support, to exercise such a power if the security of its citizens is not under direct threat, as American presidents discovered several times in the 1990s. With the Cold War forgotten, and no credible equivalent "new Cold War" looming on the horizon, the only way America may keep its military status is to lend its forces to the global security system. And have other countries pay for it. This is the ultimate twist of multilateralism, and the most striking illustration of the lost sovereignty of the nation-state.

The state does not disappear, though. It is simply downsized in the Information Age. It proliferates under the form of local and regional

governments, which dot the world with their projects, build up constituencies, and negotiate with national governments, multinational corporations, and international agencies. The era of globalization of the economy is also the era of localization of polity. What local and regional governments lack in power and resources, they make up in flexibility and networking. They are the only match, if any, to the dynamism of global networks of wealth and information.

As for people, they are, and will be, increasingly distant from the halls of power, and disaffected from the crumbling institutions of civil society. They will be individualized in their work and lives, constructing their own meaning on the basis of their own experience, and, if they are lucky, reconstructing their family, their rock in this swirling ocean of unknown flows and uncontrolled networks. When subjected to collective threats, they will build communal havens, whence prophets may proclaim the coming of new gods.

The twenty-first century will not be a dark age. Nor will it deliver to most people the bounties promised by the most extraordinary technological revolution in history. Rather, it may well be characterized by informed bewilderment.

What is to be Done?

Each time an intellectual has tried to answer this question, and seriously implement the answer, catastrophe has ensued. This was particularly the case with a certain Ulianov in 1902. Thus, while certainly not pretending to qualify for this comparison, I shall abstain from suggesting any cure for the ills of our world. But since I do feel concerned by what I have seen on my journey across this early landscape of the Information Age, I would like to explain my abstention, writing in the first person, but thinking of my generation and of my political culture.

I come from a time and a tradition, the political left of the industrial era, obsessed by the inscription on Marx's tomb at Highgate, his (and Engel's) eleventh thesis on Feuerbach. Transformative political action was the ultimate goal of a truly meaningful intellectual endeavor. I still believe that there is considerable generosity in this attitude, certainly less selfish than the orderly pursuit of bureaucratic academic careers, undisturbed by the labors of people around the world. And, on the whole, I do not think that a classification between right-wing and left-wing intellectuals and social scientists would yield significant differences in scholarly quality between the two groups. After all, conservative intellectuals also went into political action, as much as

the left did, often with little tolerance for their foes. So, the issue is not that political commitment prevents, or distorts, intellectual creativity. Many of us have learned, over the years, to live with the tension, and the contradiction, between what we find and what we would like to happen. I consider social action and political projects to be essential in the betterment of a society that clearly needs change and hope. And I do hope that this book, by raising some questions and providing empirical and theoretical elements to treat them, may contribute to informed social action in the pursuit of social change. In this sense, I am not, and I do not want to be, a neutral, detached observer of the human drama.

However, I have seen so much misled sacrifice, so many dead ends induced by ideology, and such horrors provoked by artificial paradises of dogmatic politics that I want to convey a salutary reaction against trying to frame political practice in accordance with social theory, or, for that matter, with ideology. Theory and research, in general as well as in this book, should be considered as a means for understanding our world, and should be judged exclusively on their accuracy, rigor, and relevance. How these tools are used, and for what purpose, should be the exclusive prerogative of social actors themselves, in specific social contexts, and on behalf of their values and interests. No more meta-politics, no more "*maîtres à penser*," and no more intellectuals pretending to be so. The most fundamental political liberation is for people to free themselves from uncritical adherence to theoretical or ideological schemes, to construct their practice on the basis of their experience, while using whatever information or analysis is available to them, from a variety of sources. In the twentieth century, philosophers tried to change the world. In the twenty-first century, it is time for them to interpret it differently. Hence my circumspection, which is not indifference, about a world troubled by its own promise.

Finale

The promise of the Information Age is the unleashing of unprecedented productive capacity by the power of the mind. I think, therefore I produce. In so doing, we will have the leisure to experiment with spirituality, and the opportunity of reconciliation with nature, without sacrificing the material well-being of our children. The dream of the Enlightenment, that reason and science would solve the problems of humankind, is within reach. Yet there is an extraordinary gap between our technological overdevelopment and our social underdevelopment.

Our economy, society, and culture are built on interests, values, institutions, and systems of representation that, by and large, limit collective creativity, confiscate the harvest of information technology, and deviate our energy into self-destructive confrontation. This state of affairs must not be. There is no eternal evil in human nature. There is nothing that cannot be changed by conscious, purposive social action, provided with information, and supported by legitimacy. If people are informed, active, and communicate throughout the world; if business assumes its social responsibility; if the media become the messengers, rather than the message; if political actors react against cynicism, and restore belief in democracy; if culture is reconstructed from experience; if humankind feels the solidarity of the species throughout the globe; if we assert intergenerational solidarity by living in harmony with nature; if we depart for the exploration of our inner self, having made peace among ourselves. If all this is made possible by our informed, conscious, shared decision, while there is still time, maybe then, we may, at last, be able to live and let live, love and be loved.

I have exhausted my words. Thus, I will borrow, for the last time, from Pablo Neruda:

Por mi parte y tu parte, cumplimos, compartimos esperanzas e inviernos;	*For my part and yours, we comply, we shared our hopes and winters;*
y fuimos heridos no solo por los enemigos mortales	*and we have been wounded not only by mortal enemies*
sino por mortales amigos (y esto pareció más amargo),	*but by mortal friends (that seemed all the more bitter),*
pero no me parece más dulce mi pan o mi libro entretanto;	*but bread does not seem to taste sweeter, nor my book, in the meantime;*
agregamos viviendo la cifra que falta al dolor,	*living, we supply the statistics that pain still lacks,*
y seguimos amando el amor y con nuestra directa conducta	*we go on loving love and in our blunt way*
enterramos a los mentirosos y vivimos con los verdaderos.	*we bury the liars and live among the truth-tellers.*

Constructing Knowledge Societies: New Challenges for Tertiary Education

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Cover illustration: Gennady Kurbat/Getty Images.

ISBN 0-8213-5143-5

Library of Congress Cataloging-in-Publication Data

Constructing knowledge societies : new challenges for tertiary education.

p. cm. — (Directions in development)

Includes bibliographical references.

ISBN 0-8213-5143-5

1. Education, Higher—Economic aspects—Developing countries. 2. Educational assistance—Developing countries. I. World Bank. II. Directions in development (Washington, D.C.)

LC67.68.D44 C66 2002

378.172'2—dc21

200266388

4
The Changing Nexus: Tertiary Education Institutions, the Marketplace, and the State

There is no favorable wind for those who do not know where they are going.

Seneca

This chapter examines the evolving relationship between the marketplace, the state, and tertiary education institutions. The context of these relations has evolved strikingly in recent years, which have seen three major developments: growing system differentiation, changing governance patterns, and diminished direct involvement of governments in the funding and provision of tertiary education. This chapter first describes the key dimensions of the rise of market forces in tertiary education throughout the world and the main implications of this phenomenon. It then articulates the rationale for continuing public intervention in the sector and, in conclusion, outlines the nature of an appropriate enabling framework for the further development of tertiary education.

The Rise of Market Forces in Tertiary Education

As OECD countries enroll increasingly large numbers of students, achieve higher levels of participation in tertiary education, and move toward the goal of lifelong education for all, they are experiencing significant transformations in the structure, governance, and financing of their tertiary systems. This section looks at these changes in OECD countries and then turns to how governments and tertiary education institutions in developing and transition countries are dealing with similar

conditions in the shape of financial pressures, expanding demand, and the introduction of private institutions.

The Response in OECD Countries

A major driver for change in OECD countries has been widespread concern about the rising costs of expanded tertiary education systems. Although public funding remains the main source of support for tertiary education in OECD countries, it is being channeled in new ways and supplemented increasingly by nonpublic resources. Of the eight OECD countries for which data are available, private expenditures for tertiary education have grown faster than public expenditures in seven. (France is the exception.) In Canada, Italy, the Netherlands, and Switzerland public expenditures have actually decreased in real terms (OECD 2001).

The changes in the balance of private and public funding bring market forces to bear more directly on tertiary institutions. New financing strategies, for instance, have been put in place to generate business income from institutional assets, to mobilize additional resources from students and their families, and to encourage donations from third-party contributors. Some countries have introduced or raised tuition fees, usually in combination with a student loan scheme (OECD 1998a).[1] Following the example of Japan and the United States, a few countries have encouraged the creation of private institutions. In Portugal private universities have expanded in less than a decade to represent 30 percent of tertiary education institutions, and they enroll close to 40 percent of the total student population.

Another important lever of transformation in OECD countries has been the willingness of governments to make provision of tertiary education more demand driven. Specifically, these countries are encouraging institutions to be more responsive to the new education and training needs of the economy, the shifting demands of employers, and the changing aspirations of students. With these objectives in mind, a number of countries have replaced or supplemented the traditional budget transfer mechanisms with resource allocation formulas pegged to the value of inputs and outputs. This formula-funding approach to budgetary allocation is designed to foster greater institutional autonomy by giving more management discretion to tertiary education institutions in the internal distribution and utilization of their resources. For instance, in Australia, Denmark, New Zealand, and Sweden, where funding is based on actual enrollments, tertiary education institutions have been given more autonomy in allocating resources across faculties, departments, and programs. Formula funding also provides financial incentives for improved institutional performance in relation to national policy goals.

The Rise of Private Institutions in Developing and Transition Countries

Similar trends have been observed in many developing and transition countries. In many regions one legacy of national independence was a state monopoly on tertiary education—a situation that lasted for the better part of three decades. Today, this prevailing "culture of privilege" at public expense is increasingly under pressure to change. The sources of the pressure include the spread of economic liberalism, growing political pluralism, and a rising public demand for tertiary education—a result of demographic growth and of increased access at lower educational levels that has outstripped governments' capacity to pay for provision of education at higher levels. Government funding for tertiary education has declined in relative (and sometimes even absolute) terms, forcing countries and institutions to consider alternative sources of funding and modes of provision. In particular, the growth of private institutions in response to rising demand has been much more rapid in developing countries than in most OECD countries. In many parts of the globe the growing presence of private institutions has drastically altered the traditional pattern of dominant state financing and provision. In Sub-Saharan African countries the number of private sector institutions grew from an estimated 30 in 1990 to more than 85 in 1999.

Much of this expansion has occurred in countries where economic liberalism is now fairly well established, including Kenya (21 institutions), Tanzania (14), Ghana (12), Uganda (11), and Mozambique (5). In Sudan, with eight institutions, and the Democratic Republic of Congo, with six, private provision appears to be a response to a breakdown of government capacity to maintain an effective tertiary system. In contrast to the apparent trend in anglophone countries, private initiatives in the provision of tertiary education have been nearly absent in the French-speaking nations of Africa, with the notable exception of Côte d'Ivoire, where private institutions enroll 30 percent of the student population.

Even though most private universities in Sub-Saharan Africa are quite small, with enrollments ranging from 300 to 1,000 students, this emerging sector is introducing healthy competition, innovation, and managerial efficiency. The resulting diversification of tertiary education may encourage the growth of systems that are more closely attuned to labor market demand and development needs.

In the Middle East and North Africa the growth of private tertiary education has been more recent and less dramatic. In only a handful of countries are shares of enrollments in private institutions significant. Among these countries is the Islamic Republic of Iran, where private tertiary education appeared for the first time in 1983 and where private institutions now enroll more than 30 percent of the total student popu-

lation. In Jordan private tertiary education is a fairly recent phenomenon (since 1991), but growth in enrollment has been rapid; in 1999 private institutions accounted for 35 percent of total tertiary enrollment.

Most other nations in the region still depend on the state to provide and finance the bulk of tertiary education. But even countries that had an exclusively or predominantly public sector, such as the Arab Republic of Egypt, Morocco, Tunisia, and the Republic of Yemen, have opened up in the past decade. These countries are proceeding cautiously in setting up an institutional framework that will allow for the expanded development of the private tertiary education sector. The Tunisian and Moroccan governments conducted internal discussions for several years before submitting legislation on private higher education to their respective parliaments. In Egypt at the beginning of the 1990s the government revoked the automatic guarantee of a public sector job for university graduates, and it has allowed the operation of private tertiary education institutions. Recently, the heads of state of Oman and the Syrian Arab Republic announced that private providers, including foreign ones, may enter the tertiary education market. The relative reluctance to embrace private tertiary education in the region might be explained by strong opposition from existing public institutions but also by the technical complexity of the issues—notably, quality control, fiscal equity, and relations between public and private institutions—and by fears of foreign influence if the private sector is allowed to expand without appropriate safeguards.

The shift in the balance between the state and the market has been more marked in the former socialist countries of Eastern Europe and Central Asia, where economies have been moving from central planning to liberalization. There were no private tertiary institutions in the region at the beginning of the 1990s, but today close to 350 private institutions operate there, enrolling a quarter-million students. In the Czech Republic, Hungary, Poland, and Romania private sector enrollments expanded from 12,000 students in 1990 to 320,000 in 1997. The average proportion of students in private institutions is 22 percent for the four countries, similar to that in the United States. In Romania 54 private tertiary education institutions, 15 of which are about to receive full accreditation, compete with 57 public institutions.

The emergence of the private sector is even more significant in the former Soviet republics. In Armenia the rapidly growing private sector already amounts to 36 percent of total enrollment. There are more than 100 private institutions in the Kyrgyz Republic and Ukraine, and there are over 300 in Russia, representing one-quarter of all tertiary institutions in that country. Perhaps the most extraordinary example is that of Kazakhstan, where, only two years after private higher education was legalized, 65 private institutions were in operation. Kazakhstan's presi-

dent recently announced a plan to privatize the entire tertiary education sector over the next five years.

In several countries of South and East Asia private institutions have absorbed most of the demand for tertiary education. In the Philippines and Korea, for instance, the private sector represents 80 and 75 percent of total enrollment, respectively. Until a few years ago, India and Indonesia did not have large private sectors in tertiary education, but today, in both countries, more than half of all students attend private institutions. Even in Bangladesh, where until 1992 private universities were not allowed to operate, enrollments in private tertiary education institutions already account for 15 percent of the country's student population and are growing fast.

A recent study of tertiary education in Latin America and the Caribbean found that the rapid expansion of enrollment and the increased institutional diversification in the region have not been directed by the state but, rather, have come about in response to rising social demand and changing labor markets (IDB 1999). Many countries in the region have experienced an impressive growth of private tertiary education institutions during the past 15 years. In the Dominican Republic and El Salvador the share of student enrollment in the private tertiary education sector rose from about 25 percent in 1970 to about 70 percent in 1996 (García Guadilla 1998). For the region as a whole, enrollment in private institutions represents more than 40 percent of the total student population, the next highest proportion in the world after East Asia.

Financing

The scope of state intervention has diminished in financing as well as provision. Although most cost-sharing efforts take the form of payment of tuition fees by students attending private institutions, public institutions have moved increasingly toward cost sharing, with students being charged fees in one form or another. Such cost sharing can represent between 10 and 30 percent of total costs, depending on the country and the institution. In Russia, for example, an estimated 27 percent of the students paid some fees in 1999, up from 9 percent in 1995. The Czech Republic has shifted a third of the previously highly subsidized costs of meals and accommodations to students and their families.

In Latin America and the Caribbean, fees have been introduced in public universities in Chile (beginning in the early 1980s), some Mexican universities (mid-1990s), and the University of the West Indies (late 1980s). Mongolia and China have introduced fees on a national scale. In an increasing number of countries, including Pakistan and Vietnam, although there are no charges for students who pass the university entrance examination, students who do not achieve high scores yet still

want to enroll can do so on a fee-paying basis. In Nepal the Institute of Engineering at the country's flagship tertiary institution, Tribhuvan University, has been a pioneer in imposing substantial cost sharing, coupled with a scholarship scheme for academically qualified students from low-income families. In Nigeria, where university education is provided tuition free, other forms of cost sharing and cost recovery have enabled the proportion of university budgets derived from fee income to grow from 3.6 percent in 1991 to 8.7 percent in 1999 (Hartnett 2000: 13).

Increased Autonomy in Financing and Institutional Policies

Throughout the developing world, many governments have tried to encourage greater autonomy at the institutional level, allowing universities and other tertiary education institutions more freedom to manage their resources and develop proactive income-generation policies. Box 4.1 describes the reforms at the University of Dar es Salaam in Tanzania. Japan's Ministry of Education recently made a significant move to combat institutional rigidity when it granted national universities corporate status and legal personality, with the assurance that their independence would be respected. The aim was to give the universities more flexibility in managing the resources provided through government grants, thus introducing market mechanisms and accountability and obviating the need for them to seek government approval for management actions.[2] The 1998 decision by Chinese authorities to transfer responsibility for university financing to the provinces and the larger municipalities led to significant changes in management practices and increased reliance on resource mobilization efforts. In Indonesia the four leading public universities were granted a new autonomous status at the end of 2000. In Brazil the federal government recently made efforts in that direction, but the initiative met with considerable opposition from the Congress, and the necessary legislation has not yet been passed. In May 2000 Morocco adopted a comprehensive higher education reform law with the aim of promoting university autonomy as a stimulus for improved quality and a better focus on the development needs of the country.

Caveats Regarding Market Forces

In many parts of the world increased competition from private institutions has brought about greater diversity and choice for students and has served as a powerful incentive for public universities to innovate and modernize. Although the influence of market forces is often beneficial, it can have adverse consequences if there is unbridled competition without adequate regulatory and compensatory mechanisms.

Box 4.1 A Successful Management Reform at the University of Dar es Salaam

In 2000 the University of Dar es Salaam introduced an institutional transformation program designed to bring about an overall institutional overhaul under a 15-year corporate strategic plan. Financial reforms included the separation of educational (university) and sponsorship (government) roles; the introduction of a financial information system for recording accounting and procurement activities; the divestiture of noncore services to private entities; the intensification of income-generation activities through a newly established Income Generation Unit; and a shift from block grants to directly paid student sponsorship by the government.

The parallel reform of the administrative structure involved strengthening the university's core roles and shifting noncore services to other entities; changing the composition of the council, senate, and college management boards; decentralizing decisionmaking; articulating more clearly the lines of accountability and responsibility; introducing departmental boards; and institutionalizing a culture of strategic planning. As part of the institutional transformation, core teaching and research functions are to be supported by automating all library activities, strengthening the computing center, conducting an academic audit, and installing a registration and student tracking system.

Among the factors that contributed to the success of the reform were careful planning, leadership commitment, regular reviews by the council, government support, donor assistance, and lessons from reforms in other countries.

Source: Mkude (2001).

To begin with, from an equity perspective, increased institutional choice for students is meaningful only for those who can afford to pay tuition at private institutions or for those with access to financial aid. The absence of scholarship and loan programs can lead to a paradoxical situation in which students from high-income families are overrepresented in the tuition-free public universities and students from low-income families are overrepresented in private, fee-paying universities, as is the case in Bolivia and Venezuela. In Bolivia the proportion of students from the lowest two quintiles who enrolled in private universities grew from 2 percent in 1990 to 14 percent in 1997. In several formerly socialist countries in Eastern Europe, including Russia, the introduction of tuition fees without accompanying student financial aid mechanisms has had a negative effect on equity. Students with limited financial resources are also more vulnerable in time of economic crisis, as evidenced by the sharp (20 percent) drop in tertiary education enrollments in Thailand as a consequence of the 1998–99 financial crisis.

When funding disparities among institutions are too large, it becomes increasingly difficult to maintain competition on equal terms, even in high-income countries. In the United States, for example, rising costs in tertiary education institutions, combined with reduced government budgetary support, have led to growing disparities in financial resources between public and private universities. Of the top 20 U.S. universities (*U.S. News and World Report* rankings for 2001), only two, the University of California at Berkeley and the University of Michigan, are public universities. A major factor in this evolution, as revealed by a recent survey (Smallwood 2001), is the mounting salary gap between private and public universities, making it difficult for the latter to attract the best professors and researchers. One coping strategy for public universities has been to rely increasingly on nonregular or adjunct teaching staff for undergraduate courses, thereby creating a second tier of teachers with precarious employment status and substandard remuneration.

In a global labor market for faculty, higher salaries in the universities of one country may have a negative impact on tertiary education institutions in other parts of the world and thus contribute to the brain drain described in Chapter 1. Not even top universities in Europe are immune to this threat, as is illustrated by recent complaints by British university leaders that they are no longer able to offer competitive salaries to attract eminent specialists into the academic profession (Adam 2001).

Differing Forms of Private Institutions: For-Profit and Nonprofit

Not all private institutions operate under the same regulations. While many private tertiary institutions are profit-making corporations subject to pure market mechanisms and corporate tax laws, many others are nonprofit institutions operating in countries where the laws permit the registration of corporations with special status. Nonprofit institutions differ from for-profit institutions in that they operate under a special financial requirement (a "nondistribution constraint") forbidding them to distribute surplus revenue or profits to shareholders or individuals. Any such funds must be retained within the institution for capital investment, future operating expenses, or endowments. Nonprofit tertiary education institutions often enjoy tax exemptions on surplus income and other revenue, depending on the particular country's laws. Some theorists believe that nonprofits combine market benefits with a certain social sensitivity and that the lack of a profit motive encourages them to offer fields of study that are valuable to society (the arts, the humanities, and the social sciences) but that may not be commercially lucrative. It is also suggested that the regulatory status of nonprofits may help protect underfunded

disciplines, such as expensive programs in medicine and engineering, by encouraging cross-subsidy through the recycling of financial surpluses to the more costly programs. In several Latin American countries, including Colombia and Peru, private universities are able to charge higher fees for prestige professional programs in law and accounting while subsidizing more costly disciplines such as engineering.

Nonprofits may stimulate greater private philanthropy in education by signaling to donors that investments will not be used for the private gain of trustees or owners. Tax codes can encourage private largesse by exempting philanthropic donations from taxation.

Some studies show that consumers and governments are more likely to trust nonprofit corporations over for-profit enterprises in the delivery of public goods such as education and health care. Many countries permit private for-profit and private nonprofit tertiary institutions to operate side by side, with the understanding that both types of institution have benefits and drawbacks and that a mix of institutional forms helps diversify the tertiary system. It is important for countries to focus their energies on effective quality assurance mechanisms, to be applied equally to all tertiary institutions regardless of their form—whether public or private, for-profit or nonprofit.

Rationale for State Intervention

Public goods, quasi public goods, and externalities are fairly common in the real world. They are common enough that it is necessary to take proposals for government intervention in the economy on a case-by-case basis. Government action can never be ruled in or ruled out on principle. Only with attention to detail and prudent judgment based on the facts of the case can we hope to approach an optimal allocation of resources. That means the government will always have a full agenda for reform—and in some cases, as in deregulation, that will mean undoing the actions of government in an earlier generation. This is not evidence of failure but of an alert, active government aware of changing circumstances.

Paul Krugman (1996)

As was noted earlier, the traditionally predominant role of the state in the financing and provision of tertiary education was rooted in political and economic circumstances that have now radically changed. Developing countries are rapidly moving from small, elite systems toward expanded tertiary education systems. This massification process has often outstripped government ability to finance it, leading to erosion of educational quality. Even in transition economies, where universities and

research institutes had traditionally been strong, the process of modernizing tertiary education systems has been hampered by diminished fiscal resources and competing claims from other sectors. This has severely affected the countries' ability to support tertiary education to the same extent and in the same manner as before. Again, rapid loss of educational quality at the tertiary level has been an inevitable consequence.

Although governments cannot keep up with all the fiscal demands of offering ever higher quality tertiary education, they have at least three strong reasons for supporting the sector:

- Investments in tertiary education generate external benefits essential for economic and social development. These benefits, including long-term returns from basic research and technology development and the social gains accruing from the construction of more cohesive societies, transcend the private benefits captured by individuals.
- Capital markets are characterized by imperfections and information asymmetries that constrain the ability of individuals to borrow adequately for education. These imperfections have adverse equity and efficiency consequences, undermining the participation of academically qualified but economically disadvantaged groups in tertiary education.
- Tertiary education plays a key role in support of basic and secondary education, buttressing the economic externalities produced by the lower levels of education.

Externalities

Despite the methodological difficulties involved in measuring externalities, it can be shown that tertiary education produces an array of important economic and social benefits (see Table 4.1, on page 81). Public economic benefits reflect the overall contribution of tertiary education institutions and graduates to economic growth beyond the income and employment gains accruing to individuals. As discussed in Chapter 2, in economies that rely increasingly on the generation and application of knowledge, greater productivity is achieved through the development and diffusion of technological innovations, most of which are the products of basic and applied research undertaken in universities. Progress in the agriculture, health, and environment sectors, in particular, is heavily dependent on the application of such innovations. Productivity is also boosted by higher skill levels in the labor force and by qualitative improvements that enable workers to use new technology. Increased workforce flexibility, resulting from the acquisition of general skills that facilitate adaptation, is increasingly seen as a crucial factor in economic development in the context of knowledge economies. Sustainable trans-

formation and growth throughout the economy are not possible without the contributions of an innovative tertiary education system, which helps build the absorptive capacity needed if private sector investment and donor resources are to have a lasting productive impact.

In addition to its overall contribution to economic growth, tertiary education has broad economic, fiscal, and labor market effects:

- The existence of universities and nonuniversity training institutions is important to regional development, through both direct linkages and spillover effects. The successful experiences of technology-intensive poles such as Silicon Valley in California, Bangalore in India's Karnataka State, Shanghai in China, and Campinas in São Paulo State, Brazil, attest to the strongly positive effects that the clustering of advanced human capital alongside leading technology firms can have. East Asia has several examples of technology-intensive poles, including the Daeduck Research Complex in Korea, Tsukuba Science Town in Japan, and the Hsinchu Science-Based Industrial Park in Taiwan (China) (Shin 2001). A similar pattern has been observed in human capital–intensive countries such as Singapore and Finland.
- Econometric studies undertaken by the U.S. Bureau of Labor Statistics have shown that the overall growth in consumption in the United States over the past 40 years is correlated with the general increase in educational levels, even after controlling for income (IHEP 1998: 14).
- There are indications from several OECD countries, including the United States and Canada, that increased participation in tertiary education is correlated with reduced dependence on government financial support for medical and social welfare services (housing, unemployment, food stamps, and so on).
- The population with tertiary education is more likely to contribute to an expanded tax base.

Turning to public social benefits, tertiary education promotes nation building through its contributions to increased social cohesion, trust in social institutions, democratic participation and open debate, and appreciation of diversity in gender, ethnicity, religion, and social class. Pluralistic and democratic societies need the kinds of research and analysis that are fostered through social science and humanities programs. Tertiary education may contribute to reduced crime rates and corruption and to an increased community service orientation, as manifested in philanthropic donations, support for NGOs, and charity work. There are also strong social benefits from tertiary education associated with improved health behaviors and outcomes (Wolfe and Zuvekas 1997).

When looking at the public benefits of tertiary education, it is important to highlight the existence of joint-product effects linked to the com-

plementarities between undergraduate and postgraduate education and between tertiary education and lower levels of education. Although many undergraduate and professional education programs can be conducted in separate institutions—especially low-cost training in fields like business and law that are primarily private goods and are easily offered by private sector providers able to charge full cost—high-cost activities such as basic research and various types of specialized graduate training are more efficiently organized in combination with undergraduate training (Birdsall 1996). The high degree of cross-subsidization across disciplines, programs, and levels of study makes it difficult to look at the public-good components of tertiary education institutions in isolation from other activities. In addition, economies of scale can justify public support of expensive programs, such as those in basic sciences, that are almost natural monopolies.

Capital Market Imperfections

Although more than 60 countries have student loan programs, access to affordable loans frequently remains restricted to a minority of students. The loans are not necessarily available to the students with limited resources who are in greatest need of financial aid. Except for rich economies such as Australia, Canada, New Zealand, Sweden, the United Kingdom, and the United States, few countries have national programs that reach a large proportion of students (Salmi 2000). Even where there is national coverage, top universities may remain out of reach for a significant proportion of low-income students, as indicated by a recent survey of student aid programs in the United States. That report, prepared by the Lumina Foundation, a research organization specializing in student aid issues, concludes that despite the wide range of funding options available to students, most private colleges and universities and a majority of top public institutions are not accessible for low-income students without "extraordinary financial sacrifice" (Lumina Foundation 2002). Colombia's ICETEX, the first modern student loan institution, established in 1950, has never managed to reach more than 12 percent of the student population. It has been struggling for financial survival in recent years, with coverage falling to less than 6 percent in 2001.

Where they do exist, student loans are not always available for the whole range of academic programs and disciplines. Under the innovative student loan scheme recently set up by the Mexican federation of private universities, for instance, loan eligibility is restricted to degree programs with a high market value such as engineering, business management, and law. They are not available for important disciplines in the arts and social sciences that are associated with less favorable labor market outcomes but have a potentially high social value.

Support of Primary and Secondary Education

Tertiary education institutions play a key role in support of basic and secondary education, and there is a need for more effective links among all levels of education. In fact, it is doubtful that any developing country could make significant progress toward achieving the United Nations Millennium Development Goals for education—universal enrollment in primary education and elimination of gender disparities in primary and secondary education—without a strong tertiary education system. Preservice and in-service training of teachers and school principals, from preschool to the upper secondary level, is primarily the responsibility of tertiary education institutions. Education specialists with tertiary education qualifications and university personnel participate in curriculum reform and design, in policy research and evaluation for all levels of the education system, and in setting questions for secondary school leaving examinations. In some countries, including Japan, Korea, Mexico, Nepal, and the United States, universities are even directly involved in the management of primary and secondary schools. U.S. President George W. Bush's 2002 education plan provides funding to encourage the formation of partnerships between lower-level schools and colleges and universities to improve mathematics and science instruction. In Uganda a transformed Makerere University was asked by the government in 2001 to assist in the training of local officials to improve decentralized service delivery in the social sectors. In the field of health, medical education, especially the training of medical doctors, epidemiologists, public health specialists, and hospital managers, is essential for meeting the basic Millennium Development Goals. (See Box 4.2 for an account of an initiative to improve basic health provision in Uganda.)

The linkages between tertiary education and the lower levels of schooling are multifaceted. Many dimensions of inequity at the tertiary level are conditioned by the access and opportunities available to various groups in primary and secondary education. The quality of tertiary education institutions and programs is strongly determined by the quality of secondary school graduates. Conversely, the terms of access to tertiary education institutions can influence the content and methods of teaching and learning at the high school level in a powerful way. Under conditions of severe competition for entrance into elite colleges and universities, admission criteria can significantly alter the behavior of both students and teachers in secondary schools. In most countries the content of previous examination papers, rather than the official curriculum, tends to dictate what is taught and how it is taught—and, more important, what is learned and how it is learned. Because in many countries (for example, Korea and Singapore) "elite" universities tend to select students primarily on the basis of test scores, schools and students often

Box 4.2 Leveraging Traditional Systems and Modern Knowledge to Achieve Uganda's Goals for Health

Uganda is one of the least urbanized countries in Africa; more than 80 percent of its 20 million inhabitants live in rural areas. The fertility rate is high (6.9), but only about 38 percent of all births are attended by trained health workers who have completed specialized tertiary education. The remaining 62 percent of births are attended by practically experienced but untrained traditional birth attendants (TBAs) and by relatives. The lack of trained health care workers at the tertiary level is a significant problem in a country where the maternal mortality rate (MMR) is very high, an estimated 506 maternal deaths per 100,000 births.

Uganda's Ministry of Health has chosen to address this problem partly through improvement of communications between trained health care professionals and TBAs. This initiative is being supported through the Rural Extended Services and Care for Ultimate Emergency Relief (RESCUER) project, launched in March 1996 as a pilot program. RESCUER has three components—communication, transportation, and health services delivery—that depend explicitly on highly trained health care specialists.

Uganda's rural areas are beset by classic communication problems: lack of telephone wiring, of electric current, and of enough trained health care professionals to staff all localities. Solar-powered VHF radio was identified as the means of communication that offered the broadest coverage and could link to sufficient numbers of rural community health care providers. The use of radio communications made possible an increase in the number of deliveries attended by trained personnel, and the provision of transportation services led to a rise in referrals to health units. Together, these brought about a 50 percent reduction in MMR within three years in the communities surveyed.

The RESCUER program is an elegant merger of traditional practice with modern knowledge and technology that has improved maternal health and has generated social capital by networking midwives who had been working in isolation. Interviews with the TBAs showed that the radio technology, combined with the advice of trained health care professionals, resulted in empowerment, enhanced image and local credibility of TBAs, improved patient compliance with directives, alleviation of TBAs' isolation, a reduction in delivery complications, and less panic in complicated deliveries, as well as higher TBA incomes because of the increased numbers of patients served.

Source: Musoke (2002).

focus their time and efforts on the acquisition of the narrow skills needed to pass college admission tests. This happens at the expense of generic competencies such as creative thinking, problem solving, and interpersonal and communication skills, which are increasingly valuable in an age of rapidly changing technologies.

The role of tertiary education in support of the overall education system is bound to become even more important as countries move from the universalization of basic education to the progressive massification of secondary education and become stricter in demanding mandatory tertiary education qualifications for primary and secondary school teachers. In Brazil, for instance, under federal legislation passed in 1997, by 2007 all teachers will be required to be tertiary education graduates. A teacher certification system is being developed to enforce this requirement, following the example of OECD countries such as Australia and the United States.

Although the mechanisms through which tertiary education contributes to social and economic development are not fully understood and precise measures of these contributions are not available, a preliminary effort can be made to map the interactions, as Table 4.1 illustrates.

Table 4.1 Potential Benefits from Tertiary Education

Benefits	*Private*	*Public*
Economic	Higher salaries	Greater productivity
	Employment	National and regional development
	Higher savings	Reduced reliance on government financial support
	Improved working conditions	Increased consumption
	Personal and professional mobility	Increased potential for transformation from low-skill industrial to knowledge-based economy
Social	Improved quality of life for self and children	Nation building and development of leadership
	Better decisionmaking	Democratic participation; increased consensus; perception that the society is based on fairness and opportunity for all citizens
	Improved personal status	Social mobility
	Increased educational opportunities	Greater social cohesion and reduced crime rates
	Healthier lifestyle and higher life expectancy	Improved health
		Improved basic and secondary education

Source: Adapted from IHEP (1998): 20.

Determining the Appropriate Level of Support

The existence of these important public economic and social benefits indicates that the costs of insufficient investment in tertiary education can be very high. These costs can include a reduced ability of a country to compete effectively in the global and regional economies; growth in economic and social disparities; declines in the quality of life, in health status, and in life expectancy; rising public expenditures on social welfare programs; and a deterioration of social cohesion.

At the same time, the need to consider the education system as a whole demands a comprehensive approach to resource allocation. While there is no magic number defining the "correct" proportion of resources to be devoted to tertiary education, certain guidelines can be applied to ensure a balanced distribution of budgetary resources and a sequencing of investment across the three subsectors of the education system that is appropriate to a given country's level of educational development, pattern of economic growth, and fiscal situation. Looking at the experience of OECD countries that have emphasized the role of education in supporting economic growth and social cohesion, it would seem that an appropriate range for the overall level of investment in education as a share of GDP would be between 4 and 6 percent. Expenditures on tertiary education would then generally represent between 15 and 20 percent of public education expenditures. Developing countries that devote more than 20 percent of their education budget to tertiary education (as do Bolivia, Egypt, Jordan, Swaziland, Togo, and Venezuela), and especially those countries that have not achieved universal primary education coverage (Mauritania and Niger, for example), are likely to have a distorted allocation that favors an elitist university system and does not adequately support basic and secondary education. Countries such as Senegal that spend more than 20 percent of their tertiary education budget on noneducational expenditures such as student subsidies are underinvesting in nonsalary pedagogical inputs that are crucial for quality learning.

An examination of the patterns of public spending on tertiary education in East Asia shows dramatic variation. Except for Hong Kong (China) and Singapore, the economies of the region appear to spend, on average, relatively less on tertiary education than on primary and secondary education. In the mid-1990s (1994 or 1995) public expenditure on tertiary education as a share of total government expenditure on education was 15.6 in China, 37.1 percent in Hong Kong (China), 11.4 percent in Indonesia, 12.1 percent in Japan, 8 percent in Korea, 16.8 percent in Malaysia and in the Philippines, 34.8 percent in Singapore, and 19.4 percent in Thailand (World Bank 2001b).

The Evolving Role of the State: Guidance through an Enabling Framework and Appropriate Incentives

There is no prescription for how a country creates such a culture [of knowledge] . . . But government does have a role—a role in education, in encouraging the kind of creativity and risk taking that the scientific entrepreneurship requires, in creating the institutions that facilitate ideas being brought into fruition, and a regulatory and tax environment that rewards this kind of activity.

Joseph E. Stiglitz, Nobel Prize lecture, 2001

Developing countries and transition economies face both the new challenge of supporting knowledge-driven development and the old challenge of promoting quality, efficiency, and equity in tertiary education. Given the severe fiscal and budgetary constraints affecting governments' capacity to sustain past levels of direct provision and financing of tertiary education, as well as the rise of market forces at both national and international levels, the purpose, scope, and modalities of public intervention are changing in significant ways. Instead of relying on the traditional state control model to impose reforms, countries are choosing increasingly to bring about change by guiding and encouraging tertiary education institutions, whether public or private, in a noncontrolling, flexible manner. This can be achieved in three complementary ways:

- By establishing a coherent policy framework
- By creating an enabling regulatory environment
- By offering appropriate financial incentives.

Figure 4.1 illustrates how the regulatory framework and the types of incentives used by the state interact with market forces and civil society to beget better performance and greater responsiveness among tertiary education institutions. Starting from the observation made in *World Development Report 1997* that changes in government rules and constraints are not sufficient to bring about reforms in an effective manner, the proposed analytical framework stresses the significance of three categories of mechanisms that together bear on the behavior and results of tertiary education institutions: state regulations and financial incentives; participation and partnerships with industry, civil society, and professional associations; and competition among tertiary education providers (public and private, university and nonuniversity, campus-based and virtual, and so on).

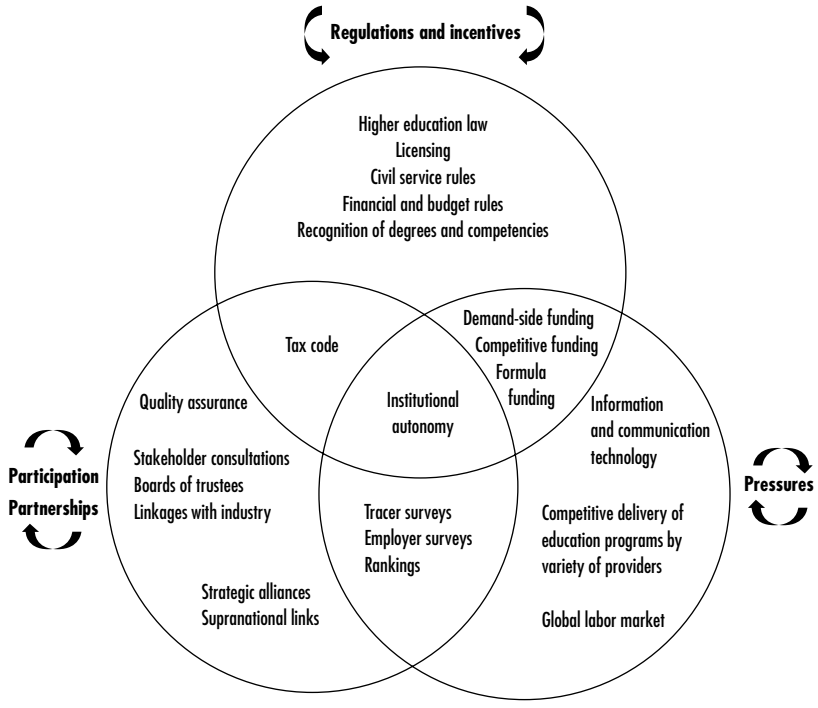
In the past the dominant role of the government in the financing and provision of tertiary education in most countries translated into a relatively simple relationship between the state and tertiary education insti-

tutions. Depending on country conditions, this relationship was characterized either by a high degree of centralized control or by a great deal of institutional autonomy. Today, the growing competition for resources and customers in the context of a global education market is producing a much more complex interplay of forces that requires proper consideration in order to understand how the transformation of tertiary education systems and institutions takes place and what levers the state and society can use to promote change.

Establishing a Coherent Policy Framework

The first step for countries and tertiary education institutions willing to take advantage of the new opportunities presented by the knowledge economy and the ICT revolution is to question the relevance of their existing structures and procedures. They cannot afford to remain pas-

Figure 4.1 Forces for Change in Tertiary Education



Source: Adapted from a figure in World Bank (2000b): 8.

sive but must be proactive in fostering innovations and launching meaningful reforms within a coherent policy framework. Although no rigid blueprint exists that is valid for all countries and institutions, a common prerequisite may be the formulation of a clear vision for the long-term development of a comprehensive, diversified, and well-articulated tertiary education system. This implies at least three dimensions: (a) outlining how the tertiary education system can most effectively contribute to national growth in the context of a globally articulated knowledge-based economy; (b) agreeing on the roles of different types of institutions within that system; and (c) determining the conditions under which the new technologies can be harnessed to improve the effectiveness and expansion of the learning experience. Many initiatives have been undertaken to develop such a vision at the national level, in both industrial and developing countries. The more recent examples come from the United Kingdom (the Dearing Report, 1997); New Zealand (the Tertiary Education Green Paper, 1998, and the Report of the Special Task Force, 2001); France (Plan for the University of the Third Millennium, 2000); Spain (the Bricall Report, 2000); South Africa (Report of the Council on Higher Education, 2000); Australia (An Agenda for the Knowledge Economy, 2001); and India (India as Knowledge Superpower: Strategy for Transformation, 2001).

The design of a tertiary education development strategy needs to reflect a comprehensive approach that integrates all the elements constituting a diversified tertiary system into a coherent, long-term vision of the mission of tertiary education as a whole and of the respective roles of each type of institution. One of the key decisions each country needs to make relates to the optimal size and shape of its tertiary education system and the choice of an appropriate strategy for raising enrollment, given the prevailing constraints on public resources. As a way of achieving quantitative expansion without sacrificing quality, countries should seek to differentiate further the provision of higher learning by encouraging a variety of institutions—public and private, large and small, universities and nonuniversity institutions, short- and medium-duration programs, liberal arts and technological institutions, research-based and scholarship institutions, campus-based and distance education programs, and so forth.

Tertiary institutions, which were once focused on training civil servants, must recognize that they are no longer producing graduates simply for public sector and civil service jobs. An increasing proportion of tertiary graduates seek work in the private sector and, in particular, the service sector. This is certainly the case in South Asia and in the Middle East and North Africa, where in the past most graduates could expect to be employed in public sector positions. But although opportunities in the private sector are increasing, private sector employment is less pre-

dictable and less secure than public employment. Tertiary education institutions and entire tertiary systems must become increasingly agile in responding to changes in the labor market. A diverse system that includes a strong set of private providers and autonomous public providers of tertiary education affords the necessary flexibility.

Increased differentiation does not necessarily imply increased segmentation of institutions and students. On the contrary, within a lifelong-learning perspective with the emphasis on responsiveness to new training demands and a more diversified clientele, student mobility can be encouraged by removing barriers to articulation among the segments of the tertiary education system, among institutions within each segment, and among disciplines and programs within institutions. The promotion of open systems can be achieved through recognition of relevant prior professional and academic experience, degree equivalencies, credit transfer, tuition exchange schemes, access to national scholarships and student loans, and creation of comprehensive qualifications frameworks like those being established in Ireland and New Zealand.[3] Multiple pathways linking secondary education, both general and vocational, to tertiary education are also needed; examples include remedial courses (such as those offered in community colleges) and bridge courses on fundamental subjects, particularly in mathematics and science. It should be noted that removal of the barriers between sectors and segments of the tertiary education system often encounters resistance because, among other reasons, increased mobility can sometimes result in a reduced share of public funding for the more privileged university sector.

Last, but not least, important for the development of a country's tertiary education vision and the necessary policy framework is consideration of the political economy of reform. Translating a vision into successful reforms and innovations depends on the ability of decision-makers to build consensus among the diverse constituents of the tertiary education community, allowing for a high degree of tolerance for controversies and disagreements (see Box 4.3). A potentially effective approach for addressing the political sensitivity of the proposed reforms is to initiate a wide consultation process concerning the need for and content of the envisaged changes. This effort involves a blend of rational analysis, political maneuvering, and psychological interplay to bring all the concerned stakeholders on board. Involving potential opponents in the policy discussion process carries risks. In Hungary, for instance, lack of success in building a consensus on the vision for tertiary education developed in the mid-1990s has resulted in poor implementation of the proposed reforms. In South Africa implementation of the tertiary education reform announced in February 2001—the culmination of four years of national consultations involving wide political debates based on the initial work of expert committees—has been stalled by the political

resistance of some constituencies. Yet ignoring the opposition altogether is a recipe for failure.

Creating an Enabling Regulatory Environment

The second important responsibility of government is to create a regulatory environment that encourages rather than stifles innovations in public institutions and initiatives by the private sector to expand access to good-quality tertiary education. Key dimensions of sector regulation include the legislative framework governing the establishment of new institutions, especially private and virtual universities; quality assurance mechanisms for all types of institutions; the administrative and financial rules and controls to which public institutions are required to conform; and legislation on intellectual property rights.

In countries with limited public resources for sustaining the expansion of tertiary education, private provision can expand educational opportunity at little or no direct public cost. Governments can encour-

Box 4.3 Consensus Building and Cost Sharing in Northern Mexico

The Mexican constitution provides for free public education at all levels, and cost sharing has always been fiercely resisted by the professors and students of the country's largest public university, the National Autonomous University of Mexico (UNAM). In 1999 the university was closed for almost a year by a strike supported by the majority of its 270,000 students after the rector suggested a US$100 increase in tuition fees, from US$8 a year.

In northern Mexico, by contrast, the rector of the University of Sonora was successful in introducing cost sharing after initiating, in 1993, a consensus-building process to explain to the staff and students the need for supplementary resources to maintain the quality of teaching and learning. After some initial resistance, including a widely publicized 2,000-kilometer march by protesters from Hermosillo to Mexico City, the students accepted the principle of a yearly payment to generate supplementary resources. A participatory process was to determine the allocation of these resources to equity and quality-improvement initiatives. Since 1994, the students have been paying an annual contribution of about US$300 for this purpose. A joint student-faculty committee administers the funds, which are used to provide scholarships for low-income students, renovate classrooms, upgrade computer labs, and purchase scientific textbooks and journals. A poster is prepared every year to disseminate information on the use of the money collected at the beginning of the academic year.

age the growth of good-quality private tertiary education institutions as a means of increasing the diversity of program offerings and broadening participation. For this to happen, it is important to remove cumbersome administrative requirements that constitute entry barriers in countries with little tradition of private tertiary education. In Spain, for instance, private universities must comply with stringent rules regarding, among other things, the number of academic programs offered, the student-teacher ratio, the proportion of full-time professors, and their academic qualifications. By contrast, in Chile the only requirement for a new university to start operating is approval of its curriculum plans and programs by an examining public university. Any direct concern with quality assurance should be deferred to accreditation bodies, not embedded in the laws that give tertiary institutions legal personality. Countries should aim for straightforward licensing procedures that outline minimum safety and educational requirements, complemented by effective quality assurance mechanisms that focus on the outputs of the new institutions.

Conscious that independent assessment is the best way to help set and maintain high standards in increasingly differentiated tertiary systems, a growing number of countries have established evaluation or accreditation bodies to promote higher-quality teaching and learning. Depending on the context, systematic modes of quality control and enhancement can take different forms. The most common approach has been a national evaluation or independent accreditation agency with authority over both public and private tertiary education institutions. In Africa Nigeria has conducted periodic accreditation assessments for 25 years, Ghana established a National Accreditation Board in 1993, and South Africa is currently engaged in a major exercise to reform its qualifications framework and adapt it to the requirements of the 21st century. In Latin America accreditation agencies have recently been created in Argentina, Chile, Colombia, and El Salvador. In the Middle East Jordan has pioneered the establishment of a national evaluation body. In Asia Indonesia was one of the first countries to create a quality assurance system, and even poorer countries with less developed tertiary education systems are following suit, as exemplified by Cambodia's current efforts to set up an accreditation committee. In Eastern and Central Europe, Hungary, Romania, Poland, and Slovenia have taken the lead in quality assurance efforts.

Notwithstanding the diversity of organizational setups among countries, corresponding to their specific needs and institutional frameworks, there are emerging areas of consensus on what constitutes an appropriate system of quality assurance aimed at discouraging ineffective educational practices and reinforcing positive ones. The core elements of quality assurance include reliance on semiautonomous agencies; agree-

ment on explicit standards and expectations; an initial self-study by the academic department, faculty, or institution concerned to complement an external review conducted by visiting peers; preparation of written recommendations; public reporting of the results; and recognition that the evaluation process in itself is at least as important as the results (El-Khawas, DePietro-Jurand, and Holm-Nielsen 1998).

Self-evaluation can promote a sense of institutional responsibility by allowing teachers and administrators, with student inputs, to identify areas of strengths and weaknesses and propose corrective actions in the form of a plan for institutional self-improvement. This process can be enhanced by independent assessments carried out by a professional association or a government oversight agency. Quality assurance mechanisms should preferably apply to both public and private tertiary education institutions, to create a level playing field.

Areas of debate surrounding quality assurance processes remain. Among them are whether accreditation should apply to specific courses or programs or whether entire institutions should be evaluated; whether accreditation should be voluntary or mandatory; whether performance indicators should be closely linked to financial rewards; and whether the same evaluation modalities should be used for different segments of the tertiary education system and different delivery modes (in-person teaching, distance education, and online programs). Clearly, with the increased focus on lifelong learning and multiple learning paths and the expansion of nontraditional educational modalities, there is an irreversible trend toward evaluation approaches that emphasize learning outcomes and acquired competencies of students over the input and process aspects of education. International experience also shows that, rather than impose rigid, punitive evaluation mechanisms, it is more effective to put in place flexible systems under which only licensing is compulsory, in order to guarantee minimum academic and public safety requirements, while accreditation and evaluation are designed as voluntary activities that can be encouraged through public information, financial incentives, and nonmonetary rewards. Table 4.2 summarizes the status of quality assurance systems, highlighting a pattern of unequal development across regions.

After quality assurance, institutional autonomy is a key element in the successful transformation of public tertiary education institutions. Autonomous institutions are more responsive to incentives for quality improvement, resource diversification, and efficient use of available resources. Tertiary education institutions must be in a position to exercise meaningful control over the principal factors affecting the quality and costs of their own programs. Autonomy includes among its many characteristics the ability of each institution to set its own admission requirements, determine the size of its student body, assess tuition and

Table 4.2 Quality Assurance Systems Worldwide

Region	*National evaluation or accreditation system present*
Eastern Europe and Central Asia	Bulgaria, Czech Rep., Estonia, Hungary, Latvia, Lithuania, Mongolia, Poland, Romania, Russia, Slovak Rep., Slovenia
East Asia and Pacific	Australia, Hong Kong (China), Indonesia, Japan, Rep. of Korea, Malaysia, New Zealand, Philippines, Singapore
Latin America and the Caribbean	Argentina, Belize, Bolivia, Brazil, Chile, Colombia , Costa Rica, El Salvador, Mexico, Nicaragua
Middle East and North Africa	Israel, Jordan
South Asia	India
Sub-Saharan Africa	Côte d'Ivoire, Ghana, Kenya, Mauritius, Namibia, Nigeria, South Africa
Western Europe and North America	Austria, Belgium, Canada, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Netherlands, Portugal, United Kingdom, United States

Source: World Bank data.

fees, and establish eligibility criteria for financial assistance to needy students. Institutions must also be free to determine their own employment conditions, such as hiring and staff remuneration, so that they can be responsive to new and rapidly changing labor market demands. Finally, institutions must have independent fiscal control, including the ability to reallocate resources internally according to self-determined criteria. Many countries deny institutions such control because of popular, but rigid, line-item budget systems. Independent fiscal control is necessary so that institutions can strengthen weak academic units, cross-subsidize programs, and fund new initiatives quickly and flexibly in response to evolving needs.

The mushrooming of virtual institutions, online education programs, and Internet-based courses raises challenging issues of intellectual property rights and academic freedom with respect to the ownership and control of educational materials developed exclusively for online or multimedia dissemination. The lack of clarity in the definition of ownership rights and in the rules for use of new educational materials can pit academics against their home institutions or against the institution contracting them to prepare course materials for online dissemination or broadcasting. Recent controversies in the United States have involved

the ownership of online courses, which has become a problematic issue debated in negotiations on the renewal of faculty collective bargaining agreements.[4] Many tertiary education institutions insist on retaining sole ownership of all online and Web courses created by their professors. Some universities, however, such as the University of North Texas, not only recognize ownership of online courses by their creators but also encourage professors to develop such courses through monetary incentives, including royalties, licensing fees, and a share of tuition fees paid by distance education students (Young 2001). The University of Vermont has even considered splitting the ownership of online courses into a content part, belonging to the professor, and an instructional design part, controlled by the university staff (Carnevale 2001). MIT's decision in 2000 to make all of its course content and materials available free of charge online is likely to influence the debate at other institutions. In many developing countries and transition economies there may be a need for the active involvement of the state in defining clear rules and mechanisms for the recognition and protection of the respective intellectual property rights of tertiary education institutions and professors.

Distance education and open universities hold out the promise of increasing coverage and facilitating access to tertiary education. As with any emerging institution, whether for-profit or nonprofit, there must be not only a realistic business plan but also an appropriate regulatory framework and institutional acceptance to improve the chances of success. (See Box 4.4, on the failure of a U.S. distance education institution.)

Because of the rapidly growing utilization of ITC in tertiary education, the level of development of the national telecommunication infrastructure and its pricing structure have a significant impact on the ability of tertiary education institutions to harness the potential of the technologies. Where the telecommunication sector has not been deregulated—for example, in the Caribbean area and in many countries of Sub-Saharan Africa—prices can be very high, and the quality of services often remains below international standards.

Offering Appropriate Financial Incentives

Government funding is likely to remain the dominant source of financing for tertiary education institutions in most countries. Financial incentives can be applied creatively to steer tertiary education institutions more effectively toward compliance with quality, efficiency, and equity goals.

To create incentives for fiscal efficiency, many OECD members and some developing countries such as Ethiopia and South Africa have abandoned the traditional approach of "negotiated" budgets, which are generally based on historical trends and political influence. These countries now favor alternative mechanisms that link funding to performance in

Box 4.4 The Failure of the United States Open University

The United States Open University (USOU), which began operation in 2000 on the model of the U.K. Open University, failed to achieve fiscal solvency. It was forced to close at the end of academic year 2002 for two critical reasons: lack of accreditation, and failure to qualify for student financial aid from public sources.

The USOU had a business plan that was perhaps overoptimistic, predicting wide acceptance of its program through name recognition and affiliation with the well-known U.K. Open University and with established traditional American universities such as the University of Maryland and Indiana State University. Accreditation was anticipated by May 2002 but that prospect did not generate enough public confidence in the program to attract sufficient numbers of students. The delay in accreditation may have been critical as a signal to students of the program's quality and the value of USOU credentials. Moreover, the ineligibility of USOU students for financial aid prevented needy students from paying tuition through public subsidy, an important element in the financing of U.S. higher education.

Source: Chronicle of Higher Education, February 10, 2002.

one way or another. A more transparent and objective way to distribute funds for recurrent expenditures uses a formula linking the amount of resources spent on inputs such as the number of students or professors to some indicator of institutional performance such as the number of graduates. Some U.S. states, including Arkansas, Kentucky, South Carolina, and Tennessee, have experimented with an approach based on the benchmarking of their tertiary education institutions against reference universities and colleges in other states. In Ontario, Canada, the funding of community colleges is linked to the outcome of key performance indicators that measure the degree of satisfaction of students, graduates, and employers with the quality and relevance of the colleges' programs and services.

It is important to note that no single ideal formula exists that is valid for all countries under all circumstances. Rather, each country, province, or state must choose an allocation mechanism consistent with the goals and priorities of its tertiary education development strategy and must be prepared to make changes over time as these goals and priorities evolve. In Poland, for instance, when a funding formula was introduced at the beginning of the 1990s to bolster quality in public universities, one of the main parameters in the funding equation was the number of full-time professors holding a doctorate. The government was successful in promoting an active training and recruitment policy for all universities, and

academic qualifications rose significantly. But in recent years university leaders have observed that the funding formula does not take into account part-time professionals who are needed to teach classes in key science and technology–related subjects. It is now recognized that the funding formula must be modified accordingly.[5]

Governments can also encourage tertiary education institutions to be more responsive to the needs of society and industry by providing incentives for them to mobilize additional resources through increased cost sharing, the sale of goods and services, and donations. The long list of income-generation activities observed in various parts of the world (see Appendix C) attests to the dynamism and ingenuity of leaders of tertiary education institutions. A critical feature of any policy designed to encourage funding diversification is to allow incremental resources to remain available for use within the institutions that generate them. Regulations that seek to capture resources obtained by the efforts of individual public institutions for use by a central authority, or policies that reduce government budget allocations to offset the incremental resources raised by the institutions, are self-defeating because they eliminate the institutions' incentive to generate additional income. Positive government incentives for income generation can take the form of, for example, matching funds linked to income generated from outside sources in some ratio, or even of a multiplier coefficient with a funding formula, as practiced in Singapore and in the U.S. state of Kentucky. Favorable tax incentives are also essential to stimulate philanthropic and charitable giving to tertiary education institutions. (In 2001 record donations of US$360 million and US$400 million, respectively, were received by the Rensselaer Polytechnic Institute from an anonymous donor and by Stanford University from the Hewlett Foundation.) Among developing countries, India has one of the most generous tax concession schemes; 100 percent of individual and corporate donations to universities is exempt from taxation.

To encourage creative investment in tertiary education institutions, some countries have established competitive funds to promote quality improvements. Under such systems, institutions are typically invited to formulate project proposals that are reviewed and selected by committees of peers according to transparent procedures and criteria. The eligibility criteria vary from country to country and depend on the specific policy changes sought. In Argentina and Indonesia, for instance, proposals can be submitted by entire universities or by individual faculties or departments. In Chile both public and private institutions are allowed to compete. In Egypt a fund was set up specifically to stimulate reforms within faculties of engineering. The system of performance contracts in France is a variation on the competitive fund mechanism. A four-year contract is prepared and signed by both the state and the institution; the

latter commits itself to a plan of action to achieve quality improvements in return for extrabudgetary financial resources.

One of the added benefits of competitive funding mechanisms is that they encourage tertiary education institutions to undertake strategic planning activities that help them formulate proposals based on a solid identification of needs and a rigorous action plan. Tertiary institutions operate in an increasingly challenging environment in which they compete for students, teaching staff, funding, and markets for their outputs (graduates and research findings). By linking institutional behavior to internal strengths and weaknesses, institutions can use systematic assessment to help define their missions, market niches, and development objectives and to formulate concrete plans for achieving their objectives. It is important to stress that strategic planning is not a one-time exercise. The more successful organizations in the business and academic worlds are those that are relentless in challenging and reinventing themselves in the pursuit of better and more effective ways of responding to the needs of their clients and stakeholders.

Another critical domain of government intervention is student financial aid. As more countries and institutions introduce cost-sharing measures—often in the form of higher tuition fees and reduced subsidies on noninstructional expenditures for such items as food, dormitories, and transportation—the state must play a crucial role in ensuring that no academically qualified student is prevented from studying by lack of financial resources. The statement by the director general of UNESCO on the need for students from well-off families to contribute more toward the cost of their education, made at the October 1998 World Conference on Higher Education, and the February 2001 declaration by the Association of African Universities on the importance of cost sharing, reflect a growing recognition that the cost of tertiary education must be shared in a more equitable way.[6] But increased cost sharing in public universities and further expansion of private tertiary education cannot be implemented equitably without the parallel development of scholarship and loan programs that can guarantee the necessary financial support to deserving low-income students unable to absorb the costs of tertiary education—both the direct costs and the indirect costs in the shape of forgone earnings.

The availability of financial aid for low-income, minority, and other disadvantaged students is a determining factor in equity. Many countries have scholarship programs for the neediest students enrolled in public tertiary education institutions, and some governments offer grants to deserving students wishing to enroll in private institutions. Chile, for instance, operates a system of financial awards for the 28,000 top students selected on the basis of their scores in the national aptitude tests given at the end of secondary school. These awards can be used for

study at either a public or a private university. Mexico and Bangladesh mandate that private universities offer scholarships to at least 5 percent of their students. But public funds for scholarships are limited, and only a small proportion of low-income students is ever likely to benefit. It appears that large-scale assistance affecting a broader segment of financially disadvantaged students can only be made available through student loan programs.

An international review of student loan schemes conducted by the World Bank (Albrecht and Ziderman 1991) found mixed results in both industrial and developing countries.[7] Because of heavily subsidized interest rates, high default rates, and substantial administrative costs, the proportion of loans repaid has not been significant in most cases, seriously compromising the long-term financial sustainability of the programs. Experience suggests that in order to design and administer an efficient and financially viable student loan scheme, the following basic conditions must be met: an appropriate marketing strategy; transparent eligibility criteria to ensure that any subsidy element is targeted to the most deserving students (academically and on social criteria); close supervision of the academic performance of the beneficiaries; carefully designed interest rate and subsidy policies to protect the long-term financial viability of the scheme; efficient collection mechanisms to minimize default; and efficient and stable management (adapted from Woodhall 1997).

In the case of private sector financing for student loan programs, positive regulatory conditions must be in place if commercial banks are to be willing to offer credits to individual students. Three key determinants of the availability of private student loans are (a) physical and logistical access based on geographic location and the capacity of the banking system; (b) the existence of good management information systems in the private banks; and (c) the availability of affordable credit. When these conditions can be satisfied, the development of private student loan schemes is possible.

Even those loan programs in developing countries that have functioned reasonably well, such as ICEES in northern Mexico, CONAPE in Costa Rica, and FUNDAPEC in the Dominican Republic, are relatively small in scale, covering no more than 10 percent of the student population. It is unclear whether efficient administration could be maintained if the programs were substantially expanded. To build up effective and sustainable large-scale programs, two options might be considered: a mixed-loan system of private funding with government guarantees, and an income-contingent loan system.

Under the first approach, following the models prevailing in Canada and the United States, student loans are administered and financed by commercial banks, with a government guarantee in case of default and

an interest subsidy to keep the loans affordable. The system being piloted in Poland since 1998 operates along these lines.

A growing number of countries—among them, Australia, Ghana, New Zealand, South Africa, and Sweden—have opted for the second approach of income-contingent loan systems (sometimes referred to as a graduate tax), in which loan repayments are a fixed proportion of a graduate's annual income. Although experience to date is limited, these systems can in theory achieve a better balance between effective cost recovery and risk to the borrower than mixed-loan programs. Administration is generally simpler and cheaper because loan recovery is handled through existing collection mechanisms such as the income tax administration or the social security system. Income-contingent loans are also more equitable and satisfy more fully the ability-to-pay principle, since repayments are in direct proportion to a graduate's income. Although income-contingent loans have considerable promise, their feasibility depends heavily on the existence of a reliable income tax or social security system with access to accurate income information and the administrative capacity to handle loan collection efficiently and effectively.

The development of borderless education represents a new challenge for student financial aid agencies. Eligibility rules and loan features must be adjusted to accommodate the financial needs of the growing number of students who are enrolled on a part-time basis, who pursue distance programs offered by a foreign institution, or who have registered for short-duration continuing education courses instead of traditional degree programs.

Finally, it should be noted that beyond their primary social purpose of providing financial aid to needy students, loan programs can also have a positive impact on the quality of tertiary education. First, the eligibility criteria for the types of universities and colleges in which beneficiaries may enroll tend to favor good-quality institutions over less reputable ones. In Mexico, for instance, the Association of Private Universities, which created a student loan agency in 1998, requires that its members be evaluated by a U.S. accreditation agency, providing a minimum quality standard. Second, student loan beneficiaries tend to achieve better academic results than their peers who do not receive a loan. Recent data released by the Student Loan Institute of Sonora show an 85 percent pass rate for beneficiaries versus 53 percent for the overall student population.

Having reviewed tertiary education and its relationship with the state, we turn, in the next chapter, to what the World Bank Group should be doing to help developing and transition countries transform their tertiary education systems and close the enrollment, equity, and quality gaps between them and the industrial countries.

Notes

1. Examples are Australia, Austria (in its newly established technical institutes modeled after the German *Fachhochschulen*), Italy, New Zealand, Portugal, Spain, and the United Kingdom.

2. Yamada Reiko (2001). See also Japan, Ministry of Education, Culture, Sports, Science and Technology, "The Education Reform Plan for the 21st Century," <http://www.mext.go.jp/english/topics/21plan/010301.htm>.

3. The National Qualifications Framework (NQF) is a key part of New Zealand's skill development strategy, a new coordinated approach to education and training that aims to raise skill levels in the country. The NQF offers a variety of entry points and pathways for people to gain new skills and qualifications at any age and at any stage in their careers; the objective is lifelong learning, from senior secondary school onward. The NQF gives all citizens the opportunity to receive national recognition for their skills and qualifications. Skills learned on the job can be recognized without the individual's having to attend a formal training course. The NQF offers greater flexibility for the learner and removes many traditional barriers to learning. Unit standards and qualifications span general, vocational, and industry-based education and training, and each is registered at an appropriate level on the NQF. There are eight levels: levels 1–3 correspond to approximately the same standard as senior secondary education and basic trades training; levels 4–6 approximate advanced trades, technical, and business qualifications; and levels 7–8 are comparable to advanced graduate and postgraduate qualifications. See New Zealand Qualifications Authority, "Framework Explained," <http://www.nzqa.govt.nz/services/frameworkexplained.html>.

4. In November 1999 a Harvard School of Law professor was reprimanded by Harvard administrators for selling videotaped lectures to the Concord University School of Law, an online degree-granting institution. An Arizona professor who developed a televised writing course for Pima Community College a few years ago has become a celebrity on local television but has had no success in getting the college to acknowledge his copyrights for the broadcast, year after year, of the videotapes he prepared (reported in Carnevale and Young 1999: A45).

5. At the Technology University of Warsaw, the impossibility of offering adequate remuneration to qualified computer science specialists from the private sector is now seen as a major obstacle to maintaining the relevance of some advanced programs (interview with the rector of the Technology University of Warsaw, Jerzy Woźnicki, February 1999).

6. "African Universities must continue to engage their governments, communities and other stakeholders in a dialogue aimed at arriving at appropriate understandings on the issue of the diversification of sources of funding, including cost-sharing initiatives" (para. 4; Association of African Universities, "Declaration on the African University in the Third Millennium," <http://www.aau.org/releases/declaration.htm>, Nairobi, February 9, 2001.

7. More than half the countries reviewed in this study were in Latin America and the Caribbean.

Arresting Development

The power of knowledge for social change

Craig Johnson

Routledge
Taylor & Francis Group
LONDON AND NEW YORK

6 Advancing knowledge for social change

> Without a historically deep and geographically broad analysis, one that takes into account political economy, we risk seeing only the residue of meaning. We see the puddles, perhaps, but not the rainstorms, and certainly not the gathering thunderclouds.
>
> Paul Farmer (2004: 309)

> Modern history begins when history becomes concerned with the future as well as with the past.
>
> E. H. Carr (1951: 2)

Introduction

The preceding chapters have described a field that has become increasingly inclined towards the rejection of grand ideas about the nature of development, the course of history and the need for social change. Instead of revolutions and grand social forces, the dominant voice in development is now one that invokes goals and targets to reduce poverty or – more cynically – to justify spending increases in foreign aid (Mosse 2005; Eyben 2006; Saith 2006). As noted in Chapter One, the problem is not that the MDGs are unworthy in their own right. Rather, it is that they are framed in a language that fails to articulate with sufficient clarity or purpose the ways in which they would address the structural factors and historical processes that perpetuate the conditions (poverty, exploitation, gender inequality, environmental degradation, etc.) they aim to address.

In this book I have argued that the retreat from grand social theory (and politics) in development reflects a number of historical factors. One has been the de-legitimation of historical social analysis in positivist (and especially American) social science. A second is the internal fragmentation of the Marxist paradigm. A third is the rise of an outlook that questions the ability of history and social science to represent other histories, cultures and people. A fourth and more general factor is the now dominant role of neo-classical theory in development theory and research.

Although it offers an important means by which scholars may expose and deconstruct the discourses of large development agencies, such as the IMF and the World Bank, post-development is in many ways a poor substitute, offering visions

of the future that either engage in unhelpful rhetoric about the underlying nature of capitalism, modernization and 'the West' or ones that obviate themselves of any apparent need to connect theory and praxis. Even Sen, who provides possibly the most important and coherent response to neo-liberalism, slips into a logic of individual decision making and rational choice, highlighting the ideological and methodological importance of adopting or at least speaking the language of neo-classical discourse.

This chapter concludes the book by situating these trends in a wider historical context and outlining a number of ways in which development studies may contribute to a body of knowledge that is inclusive, rigorous and engaged. To illustrate what I believe to be at stake in this analysis, I first want to bring us back to an analogy I used at the beginning of the book: development research, development policy and the World Bank. Next I outline two ways in which development theory may recapture the kinds of 'grand' social theory and analysis envisioned by Tilly (1984), Evans (1995) and, more recently, by Kohli (2004) and Sandbrook *et al.* (2007). The final section concludes the book by reflecting on the political and philosophical limitations of connecting social theory with a broader ideology of social change.

'Making services work for the poor'

In 2004, the World Bank (2004) unveiled an ambitious plan to improve the delivery of basic services – such as primary healthcare, universal education and clean drinking water. In its *2004 World Development Report* (World Bank 2004) the Bank made the case that the delivery of public services can improve if poor people are given the opportunity to monitor and enforce the behaviour of public officials. Alongside measures that would improve the transparency of government, amplify the 'voices' of poor people and punish/reward inappropriate behaviour on the part of public officials, improvements in public services can best be achieved by expanding the choice that 'poor clients' have in the selection of public services.

To support its case, the Bank (World Bank 2004) makes an important distinction between the 'long route' to accountability, in which 'clients' must 'go through' policymakers in order to influence and affect the behaviour of service providers, and the 'short route,' in which the transaction – and therefore accountability – implies an immediate and direct relationship between the citizen/client and the service provider. Citing school voucher programmes in Colombia and (partial) pay for service drug programmes in El Salvador and Guinea, the report suggests that subsidized or private payments on the part of the poor can 'enable clients to exert influence over providers through choice' (World Bank, 2004: 6).[88] Framed in this way, citizenship – defined on the basis of monetary exchange – provides the formal basis upon which stronger claims for effective and accountable service delivery can be made.

The theoretical core that underlies the World Bank's suggestions about what makes for better service delivery is an old one. Put simply, it suggests that the right to demand satisfaction from government – or from any service provider – is

rooted in the transfer of individual liberties, especially in private property. Prior to the establishment of liberal democracy in Western Europe, this 'transfer' was typically *non-voluntary* in the sense that labour and the fruits of one's labour were often 'extracted' without the consent of the provider (see especially, Tilly 1990: Chapter 3; Levi 1988). However, over time, and on the basis of many different social transformations, there emerged a normative and procedural link between the non-voluntary extraction of individual liberties (most commonly in the form of taxation) and the demand that government provide certain goods and services in ways that conform to historical norms and expectations (Ignatieff 2000; Macpherson 1973; Redden 2002; Tilly 1990).

By encouraging arrangements in which clients pay for services – either out of their own pockets or (in the case of voucher schemes) out of the pockets of government, donors or others – the World Bank (2004) is suggesting that the relationship between clients and service providers can be made more direct and therefore accountable. Moreover, and unlike the European model, it is suggesting that the transfer can be made *voluntarily* through the provision of choice. The idea here is, firstly, that 'choice' will give clients the power to 'take their business elsewhere,' so to speak, thereby encouraging service providers to improve their delivery (Brett 2000); and second, that the assumption of cost on the part of the client will create an incentive to monitor the performance of the service provider (World Bank 2004).

Reforming traditional modes of public administration (by encouraging decentralization) and public service delivery (by introducing vouchers, charter schools, privatization, etc.) can re-structure incentives in a way that improves the ability of government to produce (or 'co-produce') important public goods (Stein 2001; World Bank 2004). However, the assumption that citizens will demand better services and participate in democratic institutions as do clients in a market exchange, adopts a model of citizenship and markets whose roots are firmly anchored in the Western liberal democratic tradition of private property, modern taxation and public administration.

In Western democracies, debates about accountability and public services have become increasingly dependent upon the idea that the relationship between citizens and government can *and should* be understood as a relationship between clients and service providers. Writing about citizenship and entitlement to healthcare in Canada, for instance, Redden (2002) has argued that the rise of the client culture is part of a wider shift away from traditional notions of citizenship in which collective responsibility and entitlement were intimately connected, to a more atomized understanding in which the individual transfer of property constitutes the fundamental basis upon which modern citizenship is based. Along similar lines, Stein has argued that,

> The culture of choice, part of the larger tapestry of radical individualism, is nourished by the sense that government is insufficiently responsive, and that we as citizens are quite capable of making sound judgments on public issues. (Stein 2001: 82)[89]

For societies with large populations employed in informal sectors of the economy, linking the provision of services on the part of government and the extraction of revenue on the part of citizens is, in a number of ways, deeply problematic. First, 'revenue collection' in low-income countries tends to be highly informal (e.g. through tariffs, fees, bribes, etc.) and indirect (through national tariffs, the suppression of farm gate prices, etc.). The ability to articulate and demand entitlement on the basis of rights is therefore deeply constrained by the lack of direct connection between 'taxation' and government service. Moreover, the costs of collective political action (e.g. costs of travel, communication and/or potential backlash) may deter poor people from demanding better service from government (Moore and Putzel 1999).

Second, the separation between public and private life is an imperfect one, fostered in large part by the enormous role (particularly in formerly import-substituting economies, such as India) that government has played in economic life and by the compromised nature of the post-colonial state (e.g. Migdal 1988). In many low-income countries, the incentives that motivate public officials tend to be skewed heavily in favour of individual gain, and generally at the expense of the poor (indeed, the very reason people go into public life in the first place is to achieve the formal authority, which would facilitate informal gain – see Wade's [1985] classic treatment).

Third, notwithstanding some form of subsidy, requirements that payments be made in exchange for services will be disproportionately costly for the poor.

Finally, the notion that accountability can and should be articulated on the basis of proprietary rights (i.e. voluntary and non-voluntary extractions of individual liberties) is deeply rooted in a Western liberal democratic tradition, and may not be consistent with the ways in which individual and collective rights have been articulated and defended in societies lacking this tradition. In India, for instance, one could make an equally persuasive case that government's authority to rule is rooted in a profound sense of injustice which, over time, has created an obligation on the part of the state and society in general to 'compensate' the groups and individuals whose suffering reflects a prolonged history of social injustice (see especially, Khilnani 2002; Saberwal 2002; Chandhoke 2002; Galanter 2002). Viewed in this way, *reservations*, which provide special treatment (e.g. quotas in government bodies, public education, employment programmes, access to housing, and so on) for 'scheduled' castes and tribes, and *social welfare policies* (such as food for work and employment guarantees), can be understood as an entitlement to which groups and/or individuals in society have legitimate claim, irrespective of their 'ability to pay.'

In short, the idea of applying a neo-classical model of accountability (e.g. World Bank, 2004) to societies in which Western traditions of taxation, representation and the rule of law cannot be assumed is strewn with problems of logic and application. Moreover, the notion that a neo-classical model of governance and accountability can or should replace pre-existing institutions governing social, political and economic life opens an ethical hornets' nest of questions about the rights of communities, individuals, etc. to establish or maintain their own institutions and

traditions. At the risk of belabouring the point, such concerns appear to be of little interest to neo-classical theory.

Debating the discipline: big theories, local processes and the art of comparison

As noted in Chapter One, alternatives to neo-classical theory are often framed in terms of re-capturing the politics and history of development. Framed in this way, the challenge of *'re-politicizing'* development entails the (re)-establishment of an interdisciplinary paradigm that is problem-oriented, action-oriented and necessarily geared towards the construction of general theory about the historical forces that affect questions of distribution, deprivation and material well-being.

The preceding chapters describe a field that has become increasingly fragmented in terms of the theories, concepts and methodologies it uses to understand and explain complex and contextually specific processes of economic development and social change. Outside of neo-classical theory (and related fields of rational choice), the notion that social science can or should aim to develop general and predictive theories about development has become mired in a philosophical and political orientation that questions the ability of scholars to make universal or comparative statements about the nature of history, cultural diversity and progress. The result is a field that has become extremely good at documenting the nuance and complexity of local development processes, but rather less good at connecting these ground realities to wider, historical trends and forces.

Chapter One raised a number of concerns about the apparent lack of comparative methodology in development research. For one, the emphasis on local processes appears to be too far removed from the larger structural and historical transformations that now shape the political economy of development (cf. Peet and Hartwick 1999; Fine 2001; Hoogvelt 2001; Mohan and Stokke 2000). Second, the emphasis on local processes and case studies appears to limit the range of options that would in theory inform efforts to connect social theory and social change (Leys 1996; Mohan and Stokke 2000; Edwards 2002, 2006). Although ethnographic and case study research certainly have a role to play in the construction of knowledge (exploring for instance, causal mechanisms, testing or investigating the validity of theories and concepts, falsifying theoretical assumptions and producing new theories and hypotheses about social processes and events), an overriding concern is that development has become exceedingly dependent on the documentation and analysis of local and locally contingent processes and events.

Reflecting on the state of the art of development theory (circa 1990), Colin Leys (1996) argued that the 'grand' theories of Marxism, dependency and development had by the end of the 1980s been subsumed by a view of the world that explained political and social outcomes either in terms of individual decision making and rational choice or in terms of a 'discourse of "complexity,"'

> … in which everything is dissolved into its details, and the possibility of abstracting and trying to act on the main elements and forces at work in the world is obscured (if not actually denied).
>
> (Leys 1996: 196)

Ten years later, in a keynote speech to the 40th anniversary of the founding of the Institute of Development Studies at the University of Sussex, Michael Edwards lamented what he felt was an excess of disembodied empiricism, calling upon development researchers to develop 'more systematic efforts to "join the dots," to make the connections, to identify patterns of cause and effect across time and space, to place individual experiences in their wider context' (Edwards 2006: 5). Reflecting on the period in question, John Harriss suggests that:

> Most of us were inclined towards 'micro' studies rather than towards macro, and though we often sought to analyse the linkages between societal levels … too few of us examined trends in the global economy and their implications, except at the level of generality of much of the work in the dependency and world systems theoretic traditions.
>
> (Harriss 2005: 30)

The argument being made here is not that development needs to do less ethnography. Rather, and crucially, it is that development needs to do more comparison. As Charles Tilly has argued, the value of doing 'huge comparisons of big structures and large processes,' is that they:

> … help to establish what must be explained, attach the possible explanations to their context in time and space, and sometimes actually improve our understanding of those structures and processes.
>
> (Tilly 1984: 145)

Taking on board the arguments that may be levelled against comparison (e.g. Wallerstein 1986; McMichael 2000) and generalization (e.g. Johnson 2006), an important challenge therefore is to devise a way of developing comparative social analysis that can incorporate the nuance of history and context, while at the same time providing the basis upon which inferences (and therefore actions) may be based. As Paul Pierson reminds us,

> … the point is not that we need to know everything about the context of a particular phenomenon – which is not just a practical but a logical impossibility … The point is that what is too easily dismissed as 'context' may in fact be absolutely crucial to understanding important social processes.
>
> (Pierson 2004: 169)

On what basis and in what ways may development therefore become more comparative in nature and scale?

Implicit in the positions being taken by Booth (1985, 1993), Scott (1985), Chambers (1983) and Sen (1981; 1999 [2001]) is an assumption (indeed a faith) that research can be made receptive to questions of diversity and difference while at the same time productive in relation to the construction of theory. Booth (1993), for instance, suggests that the way forward is to identify and employ 'bridging themes' that could illuminate the micro-foundations of macro-processes, and also understand, through the use of local and case study research methods, issues that have clear and logical connections to wider systemic or historical processes.[90] Similarly, Vandergeest and Buttel feel it is 'possible to avoid the teleological assumptions of Marxist development sociology without lapsing into empiricism' (Vandergeest and Buttel 1988: 687).

The following sections consider two possible ways in which development research may engage in broader and more comparative forms of analysis. One, rooted squarely in the positivist tradition, aims to combine the rigor of theory and the nuance of history by using historical narratives to frame and test hypothetic–deductive models of social behaviour. A second provides an inductive means by which scholars may search for commonalities and connections to broader historical trends and problems, while at the same time incorporating divergent and potentially competing views about the nature of history, culture and context.

'Analytic narratives'

As noted in Chapter Two, positivism has traditionally eschewed the idea of ascribing causal power to historical trends and forces. However, more recent approaches have introduced the idea of combining the perceived rigor of formal modelling and statistical analysis with the contextual nuance and detail of historical narrative. Reflecting on the 'state of the art' in institutional scholarship, for instance, Campbell and Pederson (2001a) have described what they perceive to be a 'second movement' in institutional analysis, in which historical institutionalists and rational choice perspectives (along with the work of 'organizational' and 'discursive institutionalists') are merging to produce more productive forms of institutional analysis. Central to their case is the assertion that first, there is 'no a priori reason' that methodological differences (between historical and rational choice perspectives) should prevent the combination of hypothesis testing and 'thick' description and second, there are complementarities – of arguments, insights and problems – that can be developed to merge the two approaches (Campbell and Pederson 2001b).

Similarly, King *et al.* (1994) argue that science and cultural/historical interpretation 'are *not* fundamentally different endeavours aimed at divergent goals' (King *et al.* 1994: 37). On the contrary, they contend that historical and contextual narratives can complement scientific methods 'by helping to frame better questions for research' (King *et al.* 1994: 38). In this respect, their conclusions are very consistent with those put forth by Bates *et al.* (1998), in which 'analytical narratives' are advanced by combining historical analysis with formal modeling (developed largely in the tradition of game theory and rational choice).

Although one would not want to draw too fine a line of congruity,[91] current arguments in favour of complementary or 'tripartite' (Laitin 2003) ways of combining historical narrative, deductive modelling and the construction of general theory (e.g. Bates *et al.* 1998; Campbell and Pederson 2001a, 2001b; King *et al.* 1994; Laitin 2003) share with Popper (1957 [1997]) the idea that social science needs to inject a 'preconceived selective point of view into one's history' (Popper 1957 [1997]: 150), which would permit the testing of competing and falsifiable hypotheses.

Take, for instance, *Designing Social Inquiry* by Gary King, Robert Keohane and Stanley Verba (King *et al.* 1994).[92] Although the authors do not describe themselves as 'positivists' (Johnson 2006), King *et al.* (1994) share with positivism the assumption that social science should be established on a logic of inference, which establishes causal and/or descriptive regularities through empirical research, using 'public' (as opposed to private or 'esoteric') methods in which conclusions are uncertain, falsifiable, and contingent upon a recognized system of inference. Framed in this way, the formulation of questions, concepts, hypotheses and methodologies is carried out in isolation from the objects of social science research.

Central to their logic of inference is the idea that researchers develop proxies or 'observable implications' of the phenomena they want to measure. One example they use to illustrate what they have in mind here is the methodology employed by Alvarez and Asaro (1990), in which researchers collected samples of iridium to test the hypothesis that dinosaur extinction was the result of a meteorite smashing into the earth's surface (the observable implications of which would be traces of iridium in predicted layers of the earth's crust). The more general idea is, that lacking observable evidence that would represent the phenomenon in question, the careful construction of observable implications may allow researchers to associate evidence that is available with the specific assumptions of the hypothesis (in this case, that dinosaurs were killed off as a result of a giant meteorite).

Underlying their approach is the assumption that the methodology being described may provide a unified method that will lead to stronger inferences (i.e. generalizations) about the phenomena in question. For King *et al.* (1994), the ability to infer causal relations and effects is centrally dependent upon the validity and reliability of the research methodology. Validity and reliability can be enhanced, they argue:

- by articulating theories and hypotheses in terms that make specific the conditions under which the predictions of the theory may be proven right or wrong (King *et al.* 1994: 21–22);
- by recording and reporting clearly 'the process by which the data are generated' (King *et al.* 1994: 23);
- by constructing and collecting data on as many observable implications as possible (King *et al.* 1994: 24); and
- by using all relevant information in the data to generate strong inferences about causal relations (King *et al.* 1994: 26).

Like Popper (1957 [1997], 1962), the authors clearly favour an epistemology that builds upon knowledge by testing and falsifying competing claims about reality. Like Popper, they also take a critical stand on the use of history in social science research. Central to their treatment of historical and interpretive data is the idea that the original research questions and methodologies guide the selection of empirical data. For King *et al.* (1994), the challenge of incorporating history into social analysis is as follows:

> How can we make descriptive inferences about 'history as it really was' without getting lost in a sea of irrelevant detail?
>
> (King *et al.* 1994: 53)

To make sense of the past, it is incumbent upon the researcher to 'focus on the outcomes that we wish to describe or explain' (i.e. to select history according to dependent variables) and to 'simplify the information at our disposal' (King *et al.* 1994: 54). Quoting Eckstein, they suggest that 'a "case" can be defined technically as a phenomenon for which we report and interpret only a single measure on any pertinent variable' (King *et al.* 1994: 52).[93] Framed in this way, historical and other forms of qualitative data offer observations and observable implications that can be used to generate stronger inferences.

Although they concede that an appreciation of context and historical detail may help to refine the questions and concepts of social inquiry, it is clear that the questions and concepts being pursued in this context are defined and deemed relevant largely in relation to the observable implications developed through deductive reasoning. For instance, at an early point in the text the authors argue that social science research should pursue questions which are '"important" in the real world,' and 'make a specific contribution to an identifiable scholarly literature by increasing our collective ability to construct verified scientific explanations of some aspect of the world' (King *et al.* 1994: 15).[94] Later on, they warn against the 'danger' of introducing new questions or revising old hypotheses after the collection of data has begun, suggesting that questions can be posed and hypotheses formed only 'in advance' of the research process.

Similarly, Bates *et al.* (1998) argue that the methods they espouse are primarily 'problem driven,' and are not centrally concerned with building theory. However, these assertions do not appear entirely consistent with their concluding chapter (Bates *et al.* 1998), in which they assess the extent to which game theoretic models and historical narratives can be applied in other settings. Although they take great care to stress that such comparisons depend on the complementarities of the cases being compared, the very fact that they seek to assess the generalizability of their assertions suggests that they are interested in the construction of theory.

Along similar lines, Laitin (2003) argues that formal modeling and statistical analysis can (*and must*) be used to complement the contextual tapestry of historical narrative. In a particularly revealing passage Laitin (2003: 171–5) challenges Stanley Tambiah's historical account (cited in Laitin 2003) of ethnic violence among the majority Sinhalese and Tamils in Sri Lanka by demonstrating that

language grievances do not correlate comparatively or historically with the onset of violence, as Tambiah's account would lead us to believe. Developing a model of language grievance (based on the Sri Lankan case), Laitin (2003) uses statistical analysis to explain why anti-Tamil legislation was subverted by Sinhalese government officials (because they had an incentive to maintain English as a *lingua franca*) and why it was the Sinhalese (i.e. those without language grievances) who first engaged in violent attacks on the Tamils. In this way, the use of statistics and formal modelling help to construct 'a new and more coherent narrative' (Laitin 2003: 174).

Much like Popper ([1957] 1997), all of these authors advocate a hypothetic-deductive approach in which the assumptions, propositions and conclusions of formal models are tested both in terms of their logical coherence and their consistency with empirically knowable facts.

An 'anti-history machine'?

The arguments being advanced by these authors mark an important departure from the assumptions offered by positivism and, indeed, by those of the neo-classical frame. However, the historiography that underlies the convenient marriage between theory and history is very different, I think, from that which informs the aforementioned calls for history and context. Moreover, and this is quite important, it is not at all clear that historicist interpretations and the construction of positivist theory can co-exist quite so easily. As Immergut (1998) has argued, an important tension exists between historical accounts, which stress the importance of particularism, context and contingency, and the construction of theory based on the systematic comparison of historical conditions and events. Historical narratives in which social outcomes are explained in terms of a contextually specific series of conditions and events do not lend themselves well to (scientific) comparison. As she concludes:

> Without a sufficiently broad comparative perspective, historical institutionalists risk overstating the uniqueness of their case. Furthermore, it is difficult to see how such historical narratives can ever be proved wrong.
>
> (Immergut 1998: 27)

Although such assertions do not necessarily contradict the approaches favoured by Laitin (2003), Bates *et al.* (1998) and King *et al*. (1994), they do raise questions about the means by which historians and other social scientists select and interpret the 'facts' that are most important to their model. Of particular concern here is the role that history can play in social scientific research and, by extension, the way in which history is understood and applied to the understanding of social phenomena. On this question, Collingwood was deeply skeptical:

> The past, consisting of particular events in space and time which are no longer happening, cannot be apprehended by mathematical thinking … Nor

> by scientific thinking, because the truths which science discovers are known to be true by being found through observation and experiment exemplified in what we actually perceive, whereas the past has vanished and our ideas about it can never be verified as we verify our scientific hypotheses.
>
> (Collingwood 1946 [1992: 5])

To Collingwood (1946 [1992]) and to historians of his persuasion (e.g. Carr 1951; Hobsbawm 1987 [1989]; Moore 1966), critical reflection about the act of historical interpretation constitutes a central aspect of post-scientific revolution thinking about the past. In this respect, a critical reflection about the core values and assumptions that underlie social science research and social science questions is fundamental to the acquisition of knowledge. What makes the propositions being advanced by Laitin (2003), Bates *et al.* (1998) and King *et al.* (1994) particularly problematic is the relative lack of theorizing about the core values on which history and social science *should be* based.[95]

A related concern is that power and influence – as opposed to open and critical reflection and debate – will define and decide the direction of scholarship. Towards the end of their concluding chapter, Campbell and Pedersen (2001b) make the crucial observation that 'political criteria' (alongside empirical validity and normative considerations) will determine the extent to which different theoretical 'paradigms' in the institutional literature will be able to combine to produce a second movement in institutional analysis:

> There is ample evidence showing that those paradigmatic views that came to dominate the intellectual landscape at different moments in history did so in part because they were backed by substantial material resources and intellectual elites who were able to gain footholds in important institutional arenas where they could articulate their ideas, train protégés, and establish influential intellectual and professional networks for the propagation of their views.
>
> (Campbell and Pedersen, 2001b: 247)

In his critique of Bent Flyvbjerg's (2001) call for a more contextualized social science, David Laitin argues that methodologies based on context and historical narrative 'must be combined with statistical and formal analysis if the goal is valid social knowledge' (Laitin 2003: 170). Responding to the 'Perestroikan challenge' to the perceived lack of pluralism within the American Political Science Association, Laitin concludes that:

> A scientific frame would lead us to expect that certain fields will become defunct, certain debates dead, and certain methods antiquated. A pluralism that shelters defunct practitioners cannot be scientifically justified.
>
> (Laitin 2003: 180)

In other words, the explanatory utility of a methodology or a discipline can be measured in terms of the contribution it makes to our understanding of social

phenomena. Scientific rigor thus provides a 'natural' means of selecting the methodologies that will best explain the things we want to know. However, what we want to know and how we go about knowing it are surely contestable questions, whose values and assumptions should be subject to the kinds of hard inquiry that Popper (1957 [1997]) so strongly favoured. Without a strong and contested justification of what constitutes desirable social knowledge, the difference between using scientific rigor to separate good theories from bad and the construction of dogma becomes very fine indeed.

In short, ambitious attempts to merge scientific approaches with historical narratives are limited in the sense that they subvert the peculiarities of historical events to the logic of deductive reasoning. Without an explicit justification for the selection and interpretation of historical 'facts' (and for what constitutes facts), treatments of this kind are unsurprisingly threatening to those who understand history (including the questions, assumptions, values and methodologies that inform one's history) as contingent and context-specific.

A second way of incorporating history into a comparative frame is one that rejects the covering laws of hypothetic-deductive analysis and employs instead an inductive analysis of historically contingent processes and events.

Bringing history back in: advancing knowledge for social change

Calls for comparison in social science often invoke the idea that Weber may provide a more viable means of combining the rigor of social theory with the context and nuance of historical social analysis (Moore 1966; Skocpol 1979; Evans 1995; Kohli 2004). However, as Vandergeest and Buttel (1988) have argued, Weber offers a number of different interpretations about the nature of social processes, and may therefore be interpreted in a number of different ways. One 'version,' they suggest, 'consists of fitting particular cases into a pre-given model of society' (Vandergeest and Buttel 1988: 684). A second version – exemplified in the work of Karl Polanyi (1957), E. P. Thompson (1963) and Barrington Moore (1966) – suggests that 'grounded' historical analysis may provide the basis for comparative social analysis.

Underlying this second Weberian tradition are a number of assumptions about the nature of reality and the construction of knowledge. One assumption is that social structures may be used to theorize and compare different social processes and outcomes. As Philippa Bevan (2004) has argued, the assumption here is that 'durable and pervasive structures' exist, and they 'can be theorised across a range of instances' (Bevan 2004: 8). A classic case in point would be marriage, an institution which is practiced in many societies, but one whose nature varies enormously on the basis of formal rules, laws and policies and 'informal' traditions and customs.

A second assumption is that language and concepts may provide a (relatively) accurate view of the world around us. Framed in this way, reality 'has a consistently identifiable nature, and hence is imbued with inherent causal powers that can be represented indirectly by concepts' (Morrow and Brown 1994: 137).

A third assumption is that the questions and problems of social analysis are empirically and historically driven. In *The Protestant Ethic and the Spirit of Capitalism*, for instance, Weber (1958) starts from the empirical observation that the vast majority of wealth in the North American and Western European economies (at the end of the nineteenth century) tended to be concentrated in the hands of Protestant families and communities. The central aim of Weber's study is therefore to understand the social and religious factors that explain this seemingly widespread phenomenon.

A fourth and crucial assumption is that the theories, hypotheses and assumptions of social analysis are open to questions of history, contingency and context. Framed in this way, 'theory is not used to "predict," but is employed in dialogue with evidence and observation to construct an analytic account and analysis of what is and what might be possible' (Vandergeest and Buttel 1988: 688).

The basic idea is therefore that research entails a dynamic process whereby initial theories or 'conjectures' are refined and revised as the research unfolds. It also aims to infer and to build theory on the basis of structured comparative analysis.

What one compares, and how one decides the ontological boundaries of what one compares (i.e. what is a country, a society, etc.) is of course an open question. In political science, for instance, the nation-state (which includes, *inter alia*, the executive, the legislature, the bureaucracy, the military, the police and the judiciary) is commonly used to provide the primary unit of analysis. An alternative method rejects the ontological importance of national boundaries, and embraces instead the idea that individual cases (e.g. countries, societies, etc.) may be understood in relation to a wider system or whole. For instance, Philip McMichael (2000) suggests a method of 'incorporated comparison' in which the ontological boundaries of national states and histories are framed in relation to a wider historical system and process. Similarly, Charles Tilly (1984) has theorized a kind of 'encompassing comparison' in which all instances may be understood and explained in relation to a single, general system (cf. Wallerstein 1974).

How one compares is also a point of potential difference and debate. Guy Peters (1998), for instance, identifies six different ways in which scholars (primarily political scientists) may engage in comparative analysis:

- single country studies (by which he means single case studies that are compared with other cases);
- process studies (e.g. revolutions);
- institution studies (e.g. legislatures);
- 'typographical studies,' (essentially Weberian ideal types);
- regional studies (two or more countries);
- global statistical studies ('large N').

Part of the challenge of doing comparison is that the field is defined with such breadth and ambiguity that it can include a wide variety of perspectives and approaches. (Many, for instance, would disagree with Peters that case studies can

or should be included on the list). There is also the problem that aspects of what we might compare (e.g. judicial systems, education policies, central banks, etc.), which are assumed to be different or unique may be 'polluted' or affected by external/transnational factors and processes, suggesting an ontological blurring of what may have been perceived as purely 'domestic' and 'international' factors and processes. For comparative scholars, a challenge of 'doing comparison' therefore entails the problem of accounting for the multiple ways in which transnational forces and institutions may influence domestic politics, and vice versa.

In his classic book, *Big Structures, Large Processes, Huge Comparisons*, Charles Tilly (1984) argues that comparisons may be distinguished among four 'types' (ideal types, as it were):

- *individualizing comparison*, in which each case is essentially unique;
- *variation-finding comparison*, in which 'many forms of the phenomenon exist,';
- *encompassing comparison*, in which all instances may be understood and explained in relation to a single, general system (cf. Wallerstein 1974); and
- *universalizing comparison*, in which 'common properties' exist 'among all instances of a phenomenon.'

Tilly's basic point is that the typology does not depend on the 'strict internal logic' of comparison (as positivism would suggest). Rather, it offers a heuristic that helps to make sense of how and why large comparative inferences may be made.[96]

As noted earlier, the preceding chapters describe a field that has become highly dependent on single country and case study research. Using Tilly's typology, many of these would conform to what he is calling 'individualizing comparison,' in which every case is taken to be unique or 'encompassing comparison' in which single or local case studies are framed in relation to broader systemic processes and events, such as globalization, structural adjustment or the green revolution. Far less developed, I would argue, is what Tilly is calling universalizing and variation-finding forms of comparison.

To illustrate what I have in mind here, let us consider briefly three examples of the ways in which history may frame and inform the comparison of 'big structures and large processes.' One is *Embedded Autonomy*, by Peter Evans (1995).

A central aim in Evans' three-country study is to establish the conditions under which peripheral economies may undergo processes of industrial transformation and economic growth. Drawing upon developmental state theory, a central focus is on questions of state capacity and state-society relations in the developing world. His principal assertion is that effective state intervention required a 'concrete set of social ties that binds the state to society and provides institutionalized channels for the continual negotiation and renegotiation of goals and policies' (Evans 1995: 12).

Following Weber, his methodology is primarily geared towards an inductive search which 'starts with contextual differences and then looks for underlying regularities' (Evans 1995: 29). For Evans, the central challenge is to organize (and to simplify) the analysis of what are in fact three very different countries: India, South Korea and Brazil. The strategy, he suggests, is

> … to start by constructing two historically grounded ideal types: predatory and developmental states … Predatory states extract at the expense of society, undercutting development … Developmental states not only have presided over industrial transformation, but can be plausibly argued to have played a role in making it happen.
>
> (Evans 1995: 12)

The first point to make about Evans' research strategy is that it is rooted in a specific history of state formation, which offers a heuristic for understanding other cases in his study. His rendering of the predatory state, for instance, is based primarily on the political history of Zaire (Evans 1995: Chapter 3). Likewise, his understanding of developmental state properties is derived primarily from the historical literature on Japan (Johnson 1982). The second point is that his understanding of ideal types allows for variation that informs and expands his terms of analysis. Alongside his two 'ideal types,' for instance, he further theorizes the nature of state-society relations and regime type on the basis of Korea and Taiwan. A final point is that his analysis cuts across a wide and ambitious empirical terrain without lapsing into 'glorified empiricism.' 'To fulfill the potential of a comparative institutional approach,' he argues,

> The Weberian hypothesis must be explored across agencies and countries … The key is to identify differences in the way states are organized and then connect these differences to variations in development outcomes.
>
> (Evans, 1995: 40–1)

In short, Evans (1995) provides a systematic way of using history and context to theorize and establish variations concerning the ways in which states may foster processes of industrialization and development.

Similarly and building upon Evans (1995), Atul Kohli (2004) uses three 'ideal types' of state capacity to understand processes of industrialization and economic growth in India, Nigeria, South Korea and Brazil:

- *Neopatrimonial states*, having 'weakly centralized and barely legitimate authority structures, personalistic leaders unconstrained by norms or institutions, and bureaucracies of poor quality' (Kohli 2004: 9);
- *Cohesive-capitalist states*, in which effective state bureaucracies have established strong and productive relations with business and labour;
- *Fragmented-multiclass states*, in which public authority and political power is dependent upon a wider (and therefore) more fragmented coalition of social and class interests.

Again, like Evans, Kohli's conceptualization is rooted in the idea that the individual histories of India, Nigeria, South Korea and Brazil may provide the empirical basis for comparison and generalization. The value of this approach is its parsimony and its attention to historical detail. Unlike the 'combined approaches' described

earlier, it rejects the idea that social relations may be theorized on the basis of a hypothetic-deductive model and draws its theories instead from particular, long-term processes and events.

A final and more recent contribution is *Social Democracy in the Global Periphery* by Richard Sandbrook, Marc Edelman, Patrick Heller and Judith Teichman (2007). Drawing directly upon Kohli (2004), Evans (1995) and other state theorists, Sandbrook *et al.* (2007) aim to understand the historical conditions under which social democracies in the developing world have been able to reconcile 'the exigencies of achieving growth through globalized markets with extensions of political, social and economic rights' (Sandbrook *et al.* 2007: 3). Their central claim, supported by rich historical analysis, is that social democratic rights are most extensive in the instances during which lower-class mobilizations have led to broader political coalitions, which push governments into processes of social democratic reform.

Like Evans and Kohli, their frame is broad and ambitious, involving a comparative analysis of four peripheral states: Costa Rica, Mauritius, Chile and the Indian state of Kerala. It also employs a number of innovations not commonly found in political science, or in development. First, they abandon the assumption (common in comparative politics) that the only or primary unit of analysis can or should be the nation-state. Instead, they offer a comparison of three nation-states (Costa Rica, Mauritius and Chile) and one sub-national state (i.e. the Indian state of Kerala), suggesting that the crucial point of analysis and comparison concerns the constellation of power and authority governing the determination and implementation of social and economic policy.[97]

Second, their selection of states is one that moves away from the traditional focus on industrialization and economic growth (e.g. Korea, India, Brazil) to ones whose record of achievement rests in the ability to improve human development, measured in terms of primary healthcare, universal education, social security, poverty reduction and democratic reform.

Third, their methodology provides an unusually creative and collaborative way of approaching interdisciplinary research. According to their Acknowledgments (Sandbrook *et al.* 2007: vii), the book 'emerged from a movable seminar,' which involved a series of five public symposia. Although they are from different disciplinary backgrounds (two political scientists, one sociologist and one anthropologist), the authors were able to assemble a clear and coherent account that achieves strong inter-disciplinary insights about the conditions under which states and social movements may extend social, political and economic rights.

Fourth and crucially, their treatment of history employs a fascinating variation on the Weberian theme. Instead of classifying agencies, states or coalitions in terms of ideal types, the authors suggest that *historical causal factors* may be divided into three separate categories:

- *Structural factors*, shared by all four cases, involving 'early and deep, albeit dependent, integration into the global capitalist economy' (Sandbrook *et al.* 2007: 30);

- *Configurational factors*, concerning the nature and alignment of class forces, 'the most propitious pattern being one that weakens the landlords while strengthening the working and middle classes' (Sandbrook *et al.* 2007: 31); and
- *Conjunctural factors*, 'critical junctures in a country's history, in which social actors, through political struggles, propel societies down a particular path' Sandbrook *et al.* 2007: 31).

In so doing, they provide an effective means of structuring and therefore comparing their cases across space and time. But they also open and leave room for the role of politics in social analysis.

These are but three examples of studies that capture the nuance and details of history while at the same time advancing a scholarship that moves beyond the perceived limitations of positivist analysis and case study research. There are, of course, many other ways in which comparative research may be theorized and pursued in the context of development. David Landes (1998), for instance, offers a particularly grand effort to theorize and explain through history the 'wealth and poverty of nations.' Similarly, John Harriss (2000) provides an innovative attempt to theorize and compare political and economic outcomes across the Indian states.

The preceding analysis suggests that studies of this kind have been few and far between (or at the very least, they have not featured prominently in the leading development journals). For scholars entering the field (and for older ones, too) the opportunities appear to be vast.

Concluding remarks

To conclude the book, I now want to make a few final points about the normative, epistemic and historical implications raised (but not necessarily resolved) in this analysis.

One point concerns the relationship between social theory and social action. As the preceding chapters suggest, the idea of connecting social theory with social action has lost considerable ideological appeal. At a time when serious doubts were being raised about the ability of states and social movements to engineer universally desirable forms of progress, it is perhaps no surprise that social science researchers have become increasingly wedded to theories and worldviews that reject the grand sweep of history in favour of ones that collected and ascribed new meaning to the aggregation of individual needs and preferences. In *Making Social Science Matter*, for instance, Bent Flyvbjerg (2001) argues that the social sciences have moved away from what he calls 'value-rationality,' in which the ideals of natural science have usurped a more traditional Aristotelian concern for questions concerning 'Where are we going?'; 'Is this desirable?' and 'What should be done?' (Flyvbjerg 2001: 60).

The reasons for the normative retreat in American political science are a matter of some debate and go well beyond the scope of this book. Included among many possible explanations are the professionalization, fragmentation and organization

of academia (Cohn 1999; Ricci 1984); the development of new and powerful quantitative techniques (Cohn 1999); the desire to emulate natural science, particularly among mainstream economics (Fine 2001; Flyvbjerg 2001; Cohn 1999); the aversion to value-laden theorizing in America during McCarthyism and the Cold War (Leys 1996); the pragmatic orientation of development studies (Leys 1996); and, more recently, the widespread discrediting of grand normative theories of development and change (Gore 2000; Leys 1996; Schuurman 1993).

Within neo-classical economics, the power to make generalizations lies in its commitment to quantification (i.e. assigning numerical values to stated preferences) and statistical analysis. Outside of economics, the perceived advantage of using neo-classical theory to understand social phenomena rests in its ability to develop, on the basis of hypothetic-deductive models of individual decision-making, theoretical propositions about the conditions under which individuals, groups and societies will provide for themselves collective goods, such as irrigation, literacy, markets, democracy and good government.

As Ben Fine (2001) has argued, the ability of social capital to appeal to such large numbers of agencies and interests rests in its ambiguity and therefore its ability to occupy a 'middle ground' (what Fine calls a 'scholarly third wayism') that gives the impression of being receptive to questions of history and difference while at the same time offering an analysis that goes beyond 'mere description' (Fine 2001: 190). Framed in this way, a large part of its appeal stems from a desire on the part of economists to incorporate 'non-economic' factors into their analysis and the desire of non-economists to adopt the language of methodological individualism and rational choice.

But the attraction also reflects a desire on the part of development and academia in general to invent and pursue new and increasingly fashionable trends and concepts, illustrating what he suggests is 'a more general trend towards the popularisation and degradation of scholarship' (Fine 2001: 191). This degradation, he concludes, reflects the inability of development scholars (and of social scientists in general) to reconcile the 'postmodern' critique that all knowledge is biased and partial and a positivist desire to understand and describe reality:

> Where postmodernism has departed the material and objective for the symbolic and the subjective, so its alter ego in more traditional social science, rapidly being subsumed under social capital, has hardened in its use of universal analytic categories in order to address what is presumed to be an unproblematic descriptive and statistical reality.
>
> (Fine 2001: 193)

Whether postmodernism facilitated the neo-classical turn, we can certainly detect what appears to be an uncomfortable consistency between the fragmentation of politics, knowledge and reality, and the fragmentation, dislocation and globalization of economic production and social life that begins to take place during the 1960s and 1970s (Harvey, 1990). Frederic Jameson (1984) makes this link explicit when he argues that:

> … aesthetic production today has become integrated into commodity production generally: the frantic economic urgency of producing fresh waves of ever more novel-seeming goods (from clothing to airplanes), at ever greater rates of turnover, now assigns an increasingly essential structural function and position to aesthetic innovation and experimentation.
>
> (Jameson 1984: 56)

Similarly, David Harvey (1990) suggests that postmodernism represents a break with high modernist traditions in literature, architecture, scholarship and art, stemming primarily from the technological 'compression' of time and place in the context of capitalist social relations:

> Aesthetic and cultural practices are peculiarly susceptible to the changing experience of space and time precisely because they entail the construction of spatial representations and artefacts out of the flow of human experience … The experience of time and space has changed, the confidence in the association between scientific and moral judgments has collapsed, aesthetics has triumphed over ethics as a prime focus of social and intellectual concern, images dominate narratives, ephemerality and fragmentation take precedence over eternal truths and unified politics, and explanations have shifted from the realm of material and political-economic groundings towards a consideration of autonomous cultural and political practices.
>
> (Harvey 1990: 327–8)

Framed in this way, the fragmentation of theory and reality reflects a wider fragmentation of economic and social life (cf. Corbridge 1990).

A second point of conclusion concerns *the viability* of connecting theory and praxis. For scholars wedded to the idea of using class analysis to advance a more 'radical' social agenda, my emphasis on methodology, comparison *and Weber* will no doubt fall on deaf ears. Indeed, some forms of Weberian analysis have been criticized for aiming simply to understand the world, 'without an explicit agenda or politics' (Vandergeest and Buttel 1988: 690; cf. Buttel and McMichael 1994). To this critique, I would suggest that there is nothing in the methodology being advanced that would preclude the use of class analysis for social ends. Indeed, the analysis offered by Sandbrook *et al.* (2007) illustrates the powerful ways in which Weberian theory and class analysis may be combined to challenge conventional wisdoms about comparison, social democracy and development.

A final point concerns the challenge and danger of turning theories into action. As noted in Chapter One, development is a field that engenders *very* strong feelings about poverty, suffering, inequality and injustice, creating strong expectations that the study of development be intimately and essentially connected with the practice of development. The notion that theory may be assessed only or primarily in terms of its ability to provide answers and solutions to the world it 'exposes' is of course a child of the Enlightenment, and one that significantly underplays the challenge and danger of turning particular theories and ideas into action. Indeed, if Foucault

teaches us anything, it is that we be wary of theories that turn people into projects, and freedom into 'theoretical formulas' defined primarily or entirely in relation to the needs of a system or plan (Flyvbjerg 2001). Therefore, the challenge is to develop a perspective (or, dare we say, a paradigm) that can incorporate and protect the needs and perspectives of 'distant strangers' without lapsing into a relativism that denies the ability of scholars, activists, etc. to represent or compare other cultures, societies and people.

As Thomas Kuhn (1962) reminds us, paradigms consist of intellectual and institutional elements, which represent the axiomatic principles (the core questions, values, assumptions and methodologies) on which 'normal science' is based, and the organizational structures, incentives and practices in which its practitioners are engaged. Framed in this way, facts and ways of knowing are made sensible in relation to broader cultures or 'paradigms' of knowledge and science. According to Kuhn (1962), scientific revolutions occur when the application of existing theories and methodologies produces consistently unexpected results, which existing theories are unable – or unwilling – to explain. During such periods, he argues, radically new ways of posing and understanding these questions begin to emerge. However, the organizations and incentive structures that underlie modern science do not always or necessarily lend themselves to open and scholarly debate. On the contrary, the preservation of disciplines, methods and careers within and among these disciplines may produce very intense struggles over the construction of knowledge.

The evidence and argument presented in this book provide grounds for pessimism and optimism about the possibilities of transcending the current state of affairs. On one hand, the theories, concepts and methodologies of neo-classical theory appear to occupy the commanding heights of development theory and practice (Kanbur 2002). On the other, the evidence considered in this book (especially concerning the history of ideas) appears to suggest that the events and contradictions of history and human experience (e.g. the 'lost revolution,' the Holocaust, 1968) may combine to unravel theories and worldviews that no longer conform to the moral, intellectual and aesthetic norms of the time. As James Scott (1998) has argued, the 'availability of knowledge … depends greatly on the social structure of the society and the advantages that a monopoly in some forms of knowledge can confer' (Scott 1998: 334).