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ACRONYMS

CEDAW:	Convention on the Elimination of All Forms of Discrimination against Women
COMEST:	World Commission on the Ethics of Science and Technology
IBC:	International Bioethics Committee
ICSU:	International Council of Scientific Unions
ICPHS:	International Council for Philosophy and Humanistic Studies
IGBC:	Intergovernmental Bioethics Committee
IGCP:	International Geoscience Programme
IHP:	International Hydrological Programme
ISSC:	International Social Science Council
IOC:	Intergovernmental Oceanographic Commission
MAB:	Man and Biosphere
MOST:	Management of Social Transformations

PREFACE

Science and technology are shaping the future of countries across the world, and the euphoric message of belief in technology as a way to economic development continues to be dominant. While ensuring the right of scientific investigation, there is also a necessity to ensure that scientific progress is ethically acceptable. Reflecting this concern, UNESCO has made ethics of science and technology one of its five priority areas. This volume offers perspectives on some of these ethical issues from people living across Asia and the Pacific.

UNESCO's programme in this area aims to strengthen the ethical link between scientific advancement and the cultural, legal, philosophical and religious context in which it occurs. UNESCO's strategy in bioethics has been to act as a standards-setter on emerging ethical issues, to disseminate information and knowledge and to help Member States build their human and institutional capacities. The standards include the Universal Declaration on the Human Genome and Human Rights, adopted by UNESCO's General Conference in 1997 and subsequently endorsed by the United Nations General Assembly in 1998. This was followed by the International Declaration on Human Genetic Data, adopted in 2003, and the Universal Declaration on Bioethics and Human Rights, adopted by UNESCO's 33rd General Conference in 2005.

UNESCO Ethics Programmes

In pursuit of the UNESCO mandate, the Social and Human Sciences (SHS) sector seeks to advance knowledge, standards, and intellectual cooperation in order to facilitate social transformations where the values of justice, freedom, and human dignity can be fully realized. The Sector's task is to study what is, to anticipate what could be and to determine what should be in order to reduce the gap between what is and what should be.

The Sector's Programme on the Ethics of Science and Technology[1], being one of UNESCO's five priority areas, is designed to ensure that the world remains secure for everyone by placing the ongoing revolutionary scientific and technological progress within a context of ethical reflection rooted in the cultural, legal, philosophical, and religious heritage of the various human communities. This programme covers two primary areas of ethical reflection: bioethics (addressing concerns stemming from advances in life sciences), and ethics of science and technology (addressing other areas of applied ethics in relation to scientific and social developments).

In order to more effectively implement ethics and bioethics activities, the networking and partnership-building across the region must be improved with global assistance and cooperation. The meetings of 2005 and 2006 follow up a 2003 consultation meeting on Ethics of Science and Technology in Bangkok, and signal an increase in activities in ethics in the region that will be sustained into the future as countries grapple with the issues raised by science and technology.

The UNESCO Bioethics Programme[2] was created in 1993 and has been a principal priority of UNESCO since 2002. Its first major standard setting document was agreed to in 1997 after five years of deliberations in the International Bioethics Committee. At the time that the UNESCO General Conference adopted the Universal Declaration on the Human Genome and Human Rights, it was the only international instrument in the field of bioethics, and it was further endorsed by the United Nations General Assembly in 1998.

The Bioethics Programme is part of UNESCO's Division of the Ethics of Science and Technology in the Social and Human Sciences Sector. It acts as the Secretariat of two advisory bodies: the International Bioethics Committee, composed of 36 independent experts, and the Intergovernmental Bioethics Committee, composed of representatives of 36 Member States. These Committees cooperate to produce advice, recommendations, and proposals that each submits to the Director-General for consideration by UNESCO's governing bodies.

1 http://www.unesco.org/ethics
2 http://www.unesco.org/bioethics

The International Bioethics Committee (IBC) is a body of 36 independent experts that follows progress in the life sciences and its applications in order to ensure respect for human dignity and freedom. It was created in 1993. The IBC provides a global forum for in-depth bioethical reflection by exposing the issues at stake. It does not pass judgment on one position or another. Instead, it is up to each country, particularly lawmakers, to reflect societal choices within the framework of national legislation, and to decide between the different positions. The tasks of the IBC include:

(1) to promote reflection on the ethical and legal issues raised by research in the life sciences and their applications, and to encourage the exchange of ideas and information, particularly through education;

(2) to encourage action to heighten awareness among the general public, specialized groups, and public and private decision-makers involved in bioethics;

(3) to co-operate with the international governmental and non-governmental organizations concerned by the issues raised in the field of bioethics, as well as with the national and regional bioethics committees and similar bodies;

(4) (i) to contribute to the dissemination of the principles set out in the Universal Declaration on the Human Genome and Human Rights, and to the further examination of issues raised by their applications and by the evolution of the technologies in question;

(ii) to organize appropriate consultations with stakeholders;

(iii) to make recommendations addressed to the General Conference, to give advice concerning the follow-up of the Declaration, and to identify practices that could be contrary to human dignity.

Since 1998, the IBC has had statutes defining its mandate, composition, etc. The Director-General of UNESCO convenes the IBC at least once a year. Through its sessions and working groups, the Committee produces advice and recommendations on specific issues that are adopted by consensus and are widely disseminated and submitted to the Director-General for transmission to the Member States, the Executive Board, and the General Conference. The Director-General appoints the IBC's 36 members to serve in their personal capacities for four-year terms. The selection is made by taking into account cultural diversity, balanced geographical representation, and nominations from some States of qualified specialists in the life sciences and in the social and human sciences, including law, human rights, philosophy, education, and communication.

The **Intergovernmental Bioethics Committee (IGBC)** was created in 1998, under Article 11 of the statutes of the IBC (International Bioethics Committee). It is comprised of 36 Member States whose representatives meet at least once every two years to examine the advice and recommendations of the IBC. It informs the IBC of its opinions and submits these opinions along with proposals for follow-up of the IBC's work to the Director-General for transmission to Member States, the Executive Board, and the General Conference. The 36 Member States are elected by UNESCO's General Conference, taking into account cultural diversity and balanced geographical representation. Members serve for terms of about four years, from the end of the ordinary session of the General Conference in which they are elected, until the end of the second subsequent ordinary session.

The World Commission on the Ethics of Science and Technology (COMEST) was created in 1998 and is described by Professor Song in this volume (p. 1).

Mapping Experts and Data

In order to help Member States to build capacity in applied ethics, a system of databases is being created, called the Global Ethics Observatory (GEObs).[3] At the time of writing, five of these databases of GEObs are online: 1) a database of experts in applied ethics; 2) a database of ethics institutions and committees; 3) a database of teaching programmes; 4) a database of bioethics legislation from selected countries; 5) a database of codes of conduct in science and technology. The information is searchable online and available in the six official languages of UNESCO. The databases 3 and 4 include only data from some geographical areas at present, and all databases are expected to grow significantly in coming years.

3 http://www.unesco.org/ethics/geo

The process of entry includes the following steps:

Database 1

(1) Data from independent mailing lists of individuals interested and/or involved in applied ethics were combined to form one database with unique entries.

(2) Criteria for determining what constitutes an expert were drawn up. Based on these criteria, a questionnaire was created in English and French for completion by prospective experts.

(3) The questionnaire was sent to all individuals in the combined database already gathered over the years, field office databases and prospective experts not already in the combined database. This work is ongoing for the region.

(4) Many responses have been received. Review meetings are held at Headquarters to determine whether or not, according to the agreed criteria, the individuals who responded are experts and are therefore to be included in the GEO database.

Database 2

(1) A pre-existing database of bioethics institutions was used as a starting point for this second database.

(2) Steps as outlined for Database 1.

Database 3

(1) A form was created to survey ethics teaching programmes.

(2) This form was distributed to participants in conferences on ethics teaching organized by the Division of Ethics of Science and Technology and responses have been received. In the coming years, mapping of programmes will be actively conducted in Asia and the Pacific region.

(3) There have been challenges of data consistency for mapping teaching programmes, as the forms are more complex and the curricula that persons use vary widely.

Other databases are under construction. In addition, the Regional Unit for Social and Human Sciences (RUSHSAP)[4] of UNESCO Bangkok, is listing regional degree programmes in bioethics, codes of ethics in science and technology, and related resources.

UNESCO Asia-Pacific School of Ethics

RUSHSAP launched a UNESCO Asia-Pacific School of Ethics[5] for partner individuals and institutions across the region in 2006. This undertaking recognises their contribution to the implementation of goals shared in the UNESCO programmes. It also contributes to capacity development by allowing a forum for discourse about issues in policy-making. In this way, too, UNESCO facilitates networking between countries in the implementation of standards that have been agreed between different countries.

Regional and National Bioethics Conferences

UNESCO has been developing initiatives in the Asia-Pacific region for some time. In 1997, the UNESCO Asian Bioethics Conference was held in Kobe, Japan, together with the founding of the Asian Bioethics Association. There were a series of meetings on these issues organised in Japan, and in November 2003, a Bioethics Consultation meeting was held in UNESCO Bangkok.

4 http://www.unescobkk.org/rushsap
5 http://www.unescobkk.org/index.php?id=apse

In March 2005, the First Bangkok Workshop on Ethics Partnerships for Asia and the Pacific and the Fourth Session of the COMEST were held in Bangkok. In December 2005, the Twelfth Session of the UNESCO IBC was held in Tokyo, Japan. The COMEST and IBC are two statutory global committees designated by the United Nations to deliberate on these issues. The future involvement of participants in an expanding international network and activities across the region, and also globally, is one of the important outcomes of these meetings.

In 2006, the Second Bangkok Workshop on Ethics Partnerships for Asia and the Pacific was held at UNESCO Bangkok, as was a series of "Consultations on Ethical Codes in Science and Technology", which took place in Bangkok, New Delhi, Seoul and Tokyo. Additionally, the UNESCO Asia-Pacific Conference on Bioethics Education was held in Seoul, and resulted in adoption of a regional Action Plan on Bioethics Education. In March 2007, the Second UNESCO Bangkok Bioethics Roundtable (BBRT2) was held concurrant with the Eighth Asian Bioethics Conference.

National and sub-regional bioethics meetings and bioethics education training courses have also been held in many countries across the region as part of UNESCO Bangkok activities. The locations have included: Karachi, Bangalore, Vellore, Chennai, Colombo, Delhi, Bangkok, Kuala Lumpur, Manila, Tokyo, Seoul, Mumbai, Madurai, Trivandrum, Jakarta, Jogyakarta, Suva, Apia, Canberra and Hanoi.

Internationally, the Division of Ethics of Science and Technology has organized a series of ethics conferences in various countries. Through these conferences, information about UNESCO's programme of ethics of science and technology can be disseminated. The conferences also provide a platform to establish intensive contacts between experts and interested parties in the countries. The conferences are usually planned in co-operation with the National Commissions for UNESCO or other interested organizations so that a joint venture will be established that benefits all participating institutions. These "Ethics Around the World: Rotating Conferences" have as their objectives the dissemination of information and materials about activities of UNESCO ethics programmes. The meetings provide the opportunity for information exchange with national and local professionals working in the ethics field, and the creation of networks for interested target audiences. Meetings have been held in Hamedan, Iran; Ankara, Turkey; Seoul, Korea; Jakarta, Indonesia; Moscow, Russian Federation; Beijing, China; Chengdu, China; Shanghai, China; Manila, Philippines and Dunedin, New Zealand.

The Way Forward

As UNESCO seeks to advance dialogue on ethics of science and technology, the Organization acknowledges that individuals who participate in its conferences come from a range of disciplines and cultures. Unless we can freely contemplate these issues, we will not be able to present a wide range of options to the communities and societies we inhabit. UNESCO encourages freedom of expression to work for greater understanding between people, which leads to the enrichment of all who participate in such dialogues.

This collection of papers initiates a series of forthcoming books from UNESCO Bangkok offering perspectives on ethics in Asia and Pacific, with each focusing on a specific theme. These papers were originally presented during conferences on ethics in science and technology that UNESCO's Regional Unit for Social and Human Sciences (RUSHSAP) has been convening since 2005. Since intercultural communication and information-sharing are essential components of these deliberations, the books also provide theme-related discourse from the conferences.

The First UNESCO Bangkok Bioethics Roundtable was held 11-15 September, 2005, to launch UNESCO's 60th anniversary celebration in Bangkok. The UNESCO Bangkok office is the largest UNESCO branch office in the Asia-Pacific region, encompassing 46 member countries. RUSHSAP is designated as the regional office for coordinating implementation of the UNESCO programmes in the social and human sciences sector in Asia and the Pacific, which includes the programmes on ethics of science with the Division of Ethics of Science and Technology in Paris.

UNESCO wishes to thank the active discussion and participation of all who attended the UNESCO Bangkok meetings. A special thank you is due to Heather McClellan and Caroline Haddad for help in editing the papers, to Frankie Keller for transcribing the discussion section, and to Sirisak Chaiyasook for designing the publication's layout. The cover design is thanks to Alessandro Blasi. We look forward to increased discourse on these papers — not as the final word on these topics, but rather as a way to catalyze greater regional discussion about the ethics of science and technology.

Darryl Macer

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FORWARD

The United Nations Educational, Scientific and Cultural Organization (UNESCO) was founded for the purpose of promoting international peace through its programmes in the fields of Education, Science, Culture, and Communication. UNESCO was officially founded on 16 November 1945 in the aftermath of the "great and terrible war"…the war that could never be allowed to be repeated. It was founded to "create a culture of peace in the minds of men." It has striven, for the last 60 years to accomplish this by exercising, activating and augmenting the educational, scientific and cultural relations of the peoples of the entire world.

For 60 years, UNESCO has sought

- **To promote** universal literacy and equal access to education;
- **To promote** the free flow of ideas and universal access to information;
- **To promote** the expression of pluralism and cultural diversity in the media and in world information networks;
- It has striven
- **To ensure** access for all to information and communication technologies;
- **To safeguard** cultural diversity and encourage dialogue among cultures and civilizations;
- **To promote** education as a basic human right;
- **To improve** the quality of education for all;
- **To promote** innovation and policy dialogue in education;
- **To promote** the drafting and implementation of standard-setting instruments regarding cultural heritage;
- **To promote** principles and ethical norms to guide scientific and technological development, and social transformation;
- **To improve** human security by better management of the environment and social change;
- **To enhance** scientific, technical and human capacities to participate in the emerging knowledge societies; and
- **To enhance** the linkages between culture and development through capacity-building and the sharing of knowledge.

UNESCO's mandate has been broad; it has encompassed many programmes, projects and initiatives. Progress has been made, but there remains a lot to be done and our work is not finished.

The UNESCO Bangkok office is the largest UNESCO field office in the Asia-Pacific Region, which for UNESCO includes 46 member countries from Iran in the West to Japan in the East, and to the South, New Zealand and 17 Pacific Island nations. The conferences that gave rise to this publication included individuals coming from a number of these countries and also outside the region.

One of the current top five priorities of the Organization is reflection and action related to the ethics of science and technology, the topic of this volume. UNESCO Bangkok is designated as the coordinating office in the region for implementation of the UNESCO programmes on ethics of science. This includes ethics teaching programmes, implementing the Decade of Education for Sustainable Development (ESD) and increasing national and regional implementation of UNESCO declarations on bioethics, as well as supporting activities of the UNESCO International Bioethics Committee (IBC), the UNESCO Intergovernmental Bioethics Committee (IGBC) and the World Commission on Ethics of Science and Technology (COMEST).

Since 2005, UNESCO's Regional Unit in Social and Human Sciences in Asia and the Pacific has held conferences to study a vast span of bioethics issues. Experts present question how bioethics declarations

and international agreements can be applied to enhance the realities of communities across a divided and diverse world. There has been dialogue on the ethical implications of many varied themes, such as organ donations and transplants, human cloning, human embryonic stem cell research, transgenic Thai papayas, AIDS, animal rights and cultural perspectives. This publication initiates a new series of books looking at Asia-Pacific perspectives on the ethics of science, technology and bioethics. We need to learn how we can implement UNESCO and UN declarations better in this region to accomplish the Millennium Development Goals, and to do so in ways that are consistent with the variety of cultures found in this region of the world. By the publication of these papers and pertinent dialogue from the conferences, we hope that new perspectives on these issues for the global community will also improve mutual understanding between and among cultures.

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COMEST and Reflections on UNESCO's Recommendation on the Status of Scientific Researchers*

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The COMEST

Within the purview of the ethics of science and technology focus area, the World Commission on Ethics of Scientific Knowledge and Technology (COMEST) was formally created in 1998, and is composed of 18 prominent independent personalities (in 2005, these were from Brazil, Canada, Chile, Egypt, France, India, Japan, Mali, Morocco, New Zealand, Norway, People's Republic of China, Russian Federation, South Africa, Republic of Korea, Spain, and the United States of America) and 11 *ex officio* members (chairpersons of IBC, IGBC, ICSU, ICPHS, ISSC, Pugwash Conference on Science and World Affairs, IOC, MAB, MOST, IHP, IGCP) from different regions of the world and from various scientific and humanistic disciplines.

COMEST is tasked with formulating, on a scientific basis, ethical principles that can shed light on the various choices and impacts occasioned by new advancements in scientific and technological fields, thus fostering a constructive ethical dialogue on the values at stake.

COMEST is mandated as an advisory body of UNESCO, seeking to provide informed counsel to decision-makers. It functions as an intellectual forum for the exchange of ideas and experience. COMEST detects early signs of risk situations associated with science and technology, ranging from cases where countries have developed new technologies at the expense of the global environment, to issues such as the restricted access of developing countries to such technologies. It also provides a platform to promote dialogue between scientific communities, decision-makers, and the public at large.

The first phase of COMEST's work focused on the exploration of ethical issues in water usage, energy, space policy, and information, as well as on the teaching of ethics. Drawing upon dialogues from the first phase, COMEST has now adopted a new approach for the second phase of its work by supporting Member States in a range of activities with regard to ethical issues related to science and technology. COMEST has also expanded its focus, looking at the ethics of outer space, ethical codes of conduct for scientists, and environmental ethics, as well as addressing specific issues of science ethics, research ethics, ethics of technology, and ethics teaching.

Recommendation on the Status of Scientific Researchers

The UNESCO Recommendation on the Status of Scientific Researchers was made a generation ago in 1974. However, it still seems to be based on the concept of science which was prevalent in the logical positivism and the Mertonian sociology of science of the 1930s. The traditional view of science, with the norms of 'objectivity' and 'disinterestedness', was seriously challenged by the post-analytic philosophy of the 1960s and the sociology of scientific knowledge of the 1970s. As a result of the criticism of science, including the anti-science movement, the old notion of the ethical neutrality of science became obsolete.

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* Paper first presented at the Consultation Meeting on Ethical Codes in Science and Technology, UNESCO Bangkok, May 2006.

There is no consensus on the nature of science among philosophers. It is true that the new view of science has not been accepted, especially in the scientific community. The majority of scientists still cling to the traditional view. The 'science war' of the 1990s is a good example of the orthodox scientists' backlash against the supposedly subversive attempts of cultural studies of science and post-modernism. Nevertheless, the Recommendation should reflect the changing concept of science.

The Recommendation is focused on the status of researchers and is mainly interested in the freedom of science and the rights of scientists. Ever since the trial of Galileo in the seventeenth century, some scientists have had difficulties with religious authorities. The interventions in science by such authorities have been weakened considerably in recent times. The evolutionists in the United States, however, are still harassed by creation science, a pseudo-science. Freedom of science was awfully threatened in Nazi Germany and the Soviet Union under Stalin. The Aryan science and Lysenkoism were unforgettable nightmares for scientists. Even after World War II, the Cold War and such problems as racial discrimination brought forth the issues of freedom in the conduct of science. ICSU formed the Standing Committee on the Freedom in the Conduct of Science (SCFCS) in 1963.

As the adverse aspects of science came to be apparent in the latter part of the last century, a shift from freedom to responsibility became inevitable. It meant the utmost importance of the ethics of science. The creation of the Standing Committee on Responsibility and Ethics of Science (SCRES, 1996-2002) in the ICSU and the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST, 1998) in UNESCO was the natural outcome. The World Conference on Science in Budapest (1999) was the turning point towards the social responsibility of scientists and the ethics of science. There is no doubt that the autonomy and freedom of science and the welfare and rights of scientists are as important as ever. The tension between freedom of research and government interest and the trend towards more commercialization are new problems. However, more emphasis on responsibility and ethics, rather than on freedom and rights, is essential. It is justified by the fact that "science, which was seen as a positive force in securing justice, human rights and freedom, is no longer what it used to be." (Fenstad 2003).

The Recommendation mentions environmental problems, but it is not free from anthropocentrism. The time-honoured Cartesian distinction between humans and animals is now universally refuted. Animal issues were not included in the Declaration at the World Conference on Science in Budapest. The debates on animal rights are on-going, but the concern for animal rights and animal welfare is badly needed. The concept of sustainable development, which was adopted at the UN Conference on Environment and Development, Rio de Janeiro in 1992, and reaffirmed at the World Summit on Sustainable Development, Johannesburg in 2002, should also be added.

The accelerated development of bioscience and biotechnology after the 1970s raised various new ethical issues. Bioethics dealing with the Human Genome Project, genetically modified organisms (GMOs), test tube babies, cloning, stem cell research, etc., suddenly rose as an extremely important field. Western bioethics started with reflection on the cruel human experimentations by Nazi doctors. The Nuremberg Code (1947) and Helsinki Declaration (1964) are perennial classics. The irony is that the Prussian government and Weimar government made even stronger and more extensive guidelines than the above ones in 1900 and 1931, respectively. New problems such as informed consent, institutional review boards and ethics committees appeared. Bioethics is very sensitive and controversial since it is related to research with human subjects and human reproduction. The Universal Declaration on Bioethics and Human Rights in 2005 is a monumental achievement of the International Bioethics Committee (IBC) of UNESCO, in addition to the Universal Declaration on the Human Genome and Human Rights (1997) and the International Declaration on Human Genetic Data (2003). "Bioethics is no longer the exclusive concern of scientists, medical professionals or policy makers. It concerns all people." (Ten Have, 2006) Bioethical issues should be given top priority. The Universal Declaration will be the basis to go further.

In the twentieth century, there were two alleged cases of bacteriological warfare in East Asia. Japan conducted biological weapons research, including human experimentation, in China from 1932 until the end of World War II. During the Korean War, the allegations that the U.S. Forces had used bacteriological warfare in North Korea and Northeast China were raised (Tsuchiya, 2000). Big powers continued the development of biological weapons, and some developing countries joined the group.

After the terrorist attacks in the U.S. on 11 September 2001, the possibilities of bioterrorism caught much attention. Bacteriological warfare is a serious threat to humankind. At the IV International Conference on

Bioethics (2005) in Gijon, the 'Declaration against Biological Weapons' was adopted. Will the successful campaign for nuclear disarmament half a century ago happen again? Scientists should be encouraged to consider the problem sincerely. In general, scientists disagree with military research. Many research projects are connected with the military in one way or another. It is a grave problem for scientists to cut these military connections.

Breakthroughs in information and communication technology are changing human life in all respects. One billion people on the earth are interconnected on the Internet. The digital revolution is regarded as a more significant event than the fall of socialism at the end of the twentieth century. It is accelerating globalization and social changes. It also benefits productivity, economic growth and international exchange in culture (Evers, 2001). On the other hand, it is suffering from the problems of privacy, alienation and cyber crimes, as predicted half a century ago. The Internet calls on new ethics appropriate to a new era. It is the engine driving us towards increased inequality. International security is another problem to be solved.

Risks and uncertainties are two characteristics of contemporary society. The emergence of unpredictable and uncertain, and possibly catastrophic, risks made the society develop an anticipatory model: the Precautionary Principle to protect humans and the environment. It was a shift from post-damage control to pre-damage control of risks. The Precautionary Principle is useful not only for environmental ethics, but also for the ethics of emerging technologies, including nanotechnology.

During the past decades, scientists, laypeople and politicians have become increasingly aware of the importance of ethics in scientific research. Several trends have contributed to these growing concerns. First, the press has covered stories on ethical issues raised by science. Second, scientists and government officials have investigated, documented and adjudicated cases of ethical misconduct. Third, science's increasing interdependence with business and industry has generated conflicts between the values of science and business (Resnik 1998).

Scientific misconduct became a public issue in the United States in 1981, when its Congressional House of Representatives held the first hearing on the problem. In 1989, the Public Health Service created the Office of Scientific Integrity in the National Institute of Health. It means that research ethics began to be institutionalised. Similar institutions were made in Scandinavian countries, Germany and the United Kingdom during the 1990s.

In the history of science, frauds and fakes are not rare. However, the recent scandal of Hwang Woo-Suk in stem cell research is one of the biggest, considering its scope and impact. The collapse of research ethics in Korean biotechnology is not only a fatal blow to Korea, but also throws many problems to the whole world. In spite of the continuous criticisms from bioethicists, Hwang was a national hero and international star fully supported by the government, mass media and people. He looked invincible. Thanks to the information of a whistleblower and the tenacious investigation by the producers of MBC TV his research was disclosed to be a huge fake (Song, et al. 2004). It was fortunate that the verification efforts of young scientists and prompt investigation by Seoul National University brought the case to conclusion. The Korean Government hurriedly began to make a guideline for research ethics, and research integrity committees are appearing in many universities. Increasing frauds and misconducts in research are big problems all over the world. Research integrity is a challenge to the scientific community.

"Science and Society: Rights and Responsibilities", an ICSU Strategic Review (2005), emphasizes the changing relations between science and society. It points out that with regard to expert understanding of the relations of science and society, there have been significant developments in academia in recent decades.

Problems of science today are too complex to be solved by scientists alone. This is the reason why their cooperation with humanities and social science is indispensable. History and philosophy of science (HPS) was born in the nineteenth century and became a well-established interdisciplinary field by the 1940s. Science and Technology Studies or Science, Technology and Science (STS) have grown rapidly since the 1970s to be a remarkable discipline in and out of universities. Historians and philosophers of science tend to be critical of science, which makes them unpopular among scientists. However, it is expected that HPS and STS can help science in many ways. They have become sources of policy advice to

governmental and corporate decision-makers. HPS and STS should be given more roles in both science education and ethics education.

UNESCO's Recommendation sees science only in the service of humankind. Science cannot be a handmaiden to the economy. The values of science for its own sake should be taken into consideration. The "Two Cultures" problem has never been solved. The traditional dichotomy between science and culture is no longer tenable. Science, itself, is a culture. Science as a culture brings science to the general public by humanising it. Public understanding of science is best achieved by the notion of scientific culture. Popularisation does not mean enlightening ignorant people. It is necessary to develop flexible processes of two-way dialogues and communication instead of top-down lectures.

In the Recommendation there are no women scientists. During the last century, the status of women in the world improved a great deal. Yet women remain under-represented in the scientific community. They find difficulties not only in entering science, but also in advancing and in getting fair salaries. Many ethnic minorities and disadvantaged groups are also largely excluded from science. Urgent measures are needed to abolish any kind of discriminations against these groups.

Ethics education is one of the priority areas for COMEST. Science education used to concentrate on science itself. It has recently been recognized that science education should include the human and social implications of science. It is no wonder that STS is becoming an indispensable part of science education. Students who are taught solely the good side of science are destined to have a distorted view of science. Well-balanced views of science are possible by teaching them the bad side, too. It is now necessary to add the ethics of science at all levels of science education. Furthermore, the independent course of ethics of science should be compulsory for all science majors.

The "Declaration on Science and the Use of Scientific Knowledge" and "Science Agenda – Framework for Action" adopted at the World Conference on Science [footnote with dates] along with the "Universal Declaration on Bioethics and Human Rights" of UNESCO should be used as points of reference to reconsider the current usefulness and validity of the Recommendation. The perspectives of the ICSU Strategic Review are also very helpful.

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Bioethics in a Wider and Probably Original Sense*

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Bioethics is now booming throughout the world, especially among medical and comedical professionals. It is very easy to find news and topics relating to bioethical problems in newspapers as well as weekly and monthly journals, TV, and so on. Many medical and comedical schools have already introduced bioethics courses. Indeed, we are now living in an era of a bioethics boom.

Regrettably, I think something is wrong in Japan: When I ask, for example, medical and comedical students about bioethics, most students answer that "bioethics is the study of acceptable conduct by medical and comedical professionals on such advancing techniques as diagnosis of brain death, organ/tissue transplantation, *in vitro* fertilization of donor's semen and ova, and sex selection of the fetus."

According to the *Encyclopedia of Bioethics*, edited by Warren T. Reich (1978), "bioethics can be defined as the systemic study of human conduct in the area of life science and health care, insofar as this conduct is examined in the light of moral values and principles", and "bioethics encompasses medical ethics and extends beyond it".

While medical ethics in its traditional sense has dealt with value-related problems that arise in the patient-physician relationship, bioethics is more inclusive in four significant respects. They are:

(1) bioethics extends beyond human life and health to embrace issues involving animal and plant life;

(2) bioethics extends beyond individual life and health to embrace social, international, and global issues such as population control;

(3) bioethics extends beyond intra-generational life and health to embrace reproductive and inter-generational issues such as *in vitro* fertilization, gene therapy, and so on;

(4) bioethics embraces the value-related problems that arise in all health care professionals such as nurses, midwives, X-ray technicians, and so on.

In other words, bioethics may be considered a wider concept than traditional medical ethics, and can be understood standing on the utilitarian principle of "the greatest good and happiness for the greatest number". More exactly, the "greatest number" can be read as the greatest number not only of people, but of all living things, including plants and animals.

From this point of view, I think that bioethical issues can be classified into seven categories. The most important category is:

(1) sanction of life, peace, and the prevention of war—especially of nuclear war, since it affects the largest number of living things.

The list continues, in descending order of importance as I see it:

(2) security of materials and environment necessary for human life such as clean air, water, foods, fuels, greens, and so on;

(3) allocation of medical and health care resources;

(4) problems relating to elderly people (including euthanasia and mercy killing);

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(5) problems relating to handicapped fetus and children;

(6) problems relating to modern reproductive technologies such as *in vitro* fertilization, artificial insemination by donor's semen and ova, and sex selection of the fetus;

(7) problems relating to brain death and tissue/organ transplantation.

The second issue I would like to talk about today is my classification of human life based on bio-medicine. They are:

(1) the pre-cytological level human life, such as of chromosomes, hereditary genes, DNA, and so on;

(2) the cytological level human life, such as of ova and sperms;

(3) human life at the stage of fertilization and nidation in *et ex utero*;

(4) human life at the stage of zygotes, embryo, and fetus *in utero*;

(5) human life at the stage of birth;

(6) human life after birth *ex utero*;

(7) human life as a member of family and of community.

Bioethics should cover all these seven levels of stages of human life. But in present-day Japan, too little has been discussed on human life in levels five, six, and seven, mentioned above.

The third point I would like to emphasize in my speech on bioethics is that: Bioethics should be discussed from two standpoints. One is from a standpoint of human beings, in general. Another is from a standpoint which considers the traditional backgrounds of culture, habit, religion, and so on. I am calling the former as "genoethics", and naming the latter as "pheno(meno)ethics".

There have been many examples of pheno(meno)ethics in traditional religions and ancient references such as the Ten Commandments of Moses, the Seven Rules of Noah, the Five Principal Ethical Rules (in Confucianism), the Noble Eightfold Path (in Buddhism), and so on.

Regrettably, endeavours to establish a Minimum Requirement of Ethics for all peoples, for all nations, and for all countries are not yet sufficient. The standardization of pheno(meno)ethics is extremely difficult, because pheno(meno)ethics are very often the products of history, political, and socio-economic situations between and within nations and countries. On the contrary, I think that standardizing genoethics would be not so difficult. As far as I understand, genoethics is not a problem of national interest, but an issue of humanity and educational consciousness.

Particular attention is paid in this study to the constitutions of more than 30 countries. The author emphasizes the importance and necessity of standardization and establishing peace, and for the solution and avoidance of international, interracial, and interreligious conflicts already occurring or which will occur in the near future.

Finally, I would like to introduce my own tentative Genoethical Ten Rules, and a draft of Seven Rules by my coworker in Israel, Mr. Avi Gold.

Genoethical Ten Rules

(1) Do your best in carrying out your duties.
(2) Respect others' rights.
(3) Be kind to every person, animal, and plant.
(4) Never injure or kill.
(5) Save natural resources.
(6) Be more conscious of the environment and population problem.
(7) Never be greedy concerning money, goods, and sex.
(8) Tell, write, and report the truth.
(9) Care for the diseased, the disabled, the elderly, and children.
(10) Care for your own health.

Seven Rules of Genoethics

(1) Respect the rights of the individual.

(2) Respect and honour parents and elders.

(3) Prohibition of murder, theft, and adultery.

(4) Prohibition of lying (importance of telling the truth).

(5) Protection of the individual against greed.

(6) Establishing legal systems with courts of law.

(7) Prevention of cruelty to animals and the consideration of the feelings of animals.

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Pacific Ethics and Universal Norms*

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Introduction

The expansion in technology in recent years, especially in health and agriculture, has highlighted the need to reflect on the moral dilemmas of these advances. It has led to research and public debate on ethics issues; the establishment of various forms of bioethics committees (*UNESCO Guide No. 1. Establishing Committees*); and, as will be discussed in this paper, the drafting of the Universal Declaration on Bioethics as a standard-setting mechanism for ethics behaviours. The Pacific has not kept pace with these developments, and the absence of mechanisms for implementing ethics has made the Pacific vulnerable to unethical research practices by external agencies, acts of biopiracy, and the loss of biodiversity.

It has become vital for Pacific nations to establish some form of bioethics committee and/or ethics debate to critique research and technological initiatives, and to ensure that the community is informed and ready to make decisions about these issues. The question is: What form should these ethics-focused initiatives take? Pacific ethics[6] is grounded in customary ways and are reinforced by Christian teachings. The fundamental belief is that family communal systems ensure the spiritual, economic, and social security of family members, and they set the standards for all behaviour. This knowledge has been passed on by word of mouth, from generation to generation. Universal declarations, on the other hand—such as the Universal Norms of Bioethics[7]—are documented, feature a rights-based framework, and assume a set of universals.

This paper argues that the Pacific challenge is to develop a post-colonial ethics discourse that is "Pacific in philosophy and locally grounded in context." The influence of changing times is central to this process, as seen in the words of Maori scholar Te Rangi Hiroa (Dr Sir Peter Buck) "The old world created by our Polynesian ancestors has passed away and a new world is in the process of being fashioned" (NZ Herald, 2005). While Pacific research continues to emphasize the endurance of customary ways, there is also a growing recognition of the role of universal rights and principles. For example, the recent public monarchy confrontations in Tonga (2005) began on a platform of poverty-related grievances, but they moved quite quickly to impassioned appeals for rights and democratic principles. Sovereignty issues are also gaining prominence in Pacific small island developing states (SIDS)—including the emergence of more critical appraisal of the relevance of global conventions to the Pacific, and the "right" of external agencies to set those agendas.

This paper begins with an outline of Pacific ethics principles, followed by a summary of the Declaration of Universal Norms of Bioethics, and then raises some potential tension points between the two. Next, some future directions for ethics research, teaching, and debate in the Pacific are proposed.

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6 Ethics is defined as a "moral philosophy prescribing what is right and what is wrong… it states how the world ought to be rather than how it is" (Siwatibau 2005).

7 While this paper looks at the Bioethics Declaration, similar comments could be applied to other conventions, such as the International Declaration on Human Genetic Data, for example (SHS/Bio/04/1), CEDAW or the CRC.

Pacific Ethics and Universal Declarations

Because Pacific values and beliefs are transmitted orally, many have incorrectly assumed that these thoughts are not important or are effectively non-existent. Ethics has a central place in the Pacific's indigenous knowledge systems and processes. Each daily life event is seen through a lens of ethical values, mores, and codes of conduct developed over years. Indigenous ethical systems incorporate technical insights and wisdom-based observations of natural, social, and spiritual phenomena which, in turn, validate place and identity, as well as the survival of Pacific nations in our increasingly globalized societies. These ethics principles have developed hand-in-hand with the society's epistemological systems—they are central to how knowledge is gained and organized, how knowledge is used, and who has access to it:

> Every Pacific society has a framework of knowledge that is systematically gathered and formulated within a paradigm of general truths and principles. Knowledge gathering and systems of validating knowledge and legitimising information are processes that are often determined and regulated (but not exclusively) by a select group within the traditional hierarchy of knowledge with the aim of protecting the quality and well [sic] being of people (Health Research Guidelines, 2005:10).

In Pacific knowledge systems, priority is given to relationships, both between humans as well as with the land and the sea. Stories explaining the deeds of past generations and the symbolic nature of the landscape can be found in songs, laws, history instruction, and social systems. Relationships are holistic in nature and embody the human, spiritual, and natural worlds. There are the genealogies, such as the Maori *whakapapa*, that determine place, values, and desirable behaviours. Identity, self-esteem, and "place" were integral to these systems, and still are.[8]

> When Maori look at the landscape they 'see' kinship relationships. The knowledge that is vital to understanding how the relationships are formed, operate and are maintained is used to maintain the environment (Ng Pae o te Maramatanga Journal 1: Marginalisation, 2005)

In summation, knowledge in Pacific societies is collective and aimed at maintaining the relationships between people—past, present, and future generations—and the environment. While ownership of knowledge is familial and collective, differentiation can be made between knowledge that is protected and knowledge that is shared. In addition, because the focus in on maintaining relationships, knowledge sharing is an interactive and dynamic process. In this value system, the "process" by which knowledge is gained is as important as the "content". The central position of process is seen in the Health and Research Council of New Zealand guiding principles for ethical research.

Guiding Principles for Forming/Maintaining Ethical Research (Guidelines on Pacific Health Research (2004))

- Relationships
- Respect
- Cultural competency
- Meaningful engagement
- Reciprocity
- Utility
- Rights
- Balance
- Protection
- Capacity building
- Participation

8 The majority of land in the Pacific's small island states is held in customary tenure for use by family members. E.g., estimates are that over 90% of land in Samoa is in customary tenure, similarly for Papua New Guinea.

These guidelines were identified through a series of intensive debates and negotiations within the Pacific community. This consultation process ensured the relevance, validity, and ownership of the principles, and kept the community informed and knowledgeable about these issues, thereby increasing the likelihood of these principles being applied. Informed community participation such as this is a vital element in the identification and implementation of ethics policies and practices, particularly in the Pacific's communal societies.

The Universal Declaration on Bioethics and Human Rights

The Universal Declaration on Bioethics and Human Rights is a standard-setting mechanism. The 28 articles of the Declaration include goals, aims, general fundamental principles, derived principles, procedural principles, procedures, and promotion and implementation mechanisms.

Potential Tension Points

The standard-setting function of the Declaration is seen in aim 1 to provide a universal framework of fundamental principles and basic procedures designed to guide States in the formulation of their legislation and their policies in the field of bioethics, and to form the basis for guidelines in bioethical matters for institutions, groups and individuals concerned.

Few would argue with this statement or question the need for the Pacific to develop legislation and policies in bioethics that will guide national decision-making and also protect Pacific SIDS from incidents such as external researchers carrying out research in the Pacific that would be prohibited in their home country[9] and acts of biopiracy. However, the predominantly rights-based framework of the declaration and the assumption of overarching universals present clear room for tension with Pacific understandings, as seen in the following examples.

Rights

The rights-based strategy is set out in the aims and repeated throughout in many articles. The following words capture the clear conceptual differences between this human rights focus and the Pacific collective value base: "within a Pacific framework, the focus shifts from the individual rights and the emphasis is given instead to both the group and interpersonal relationships… this does not negate individual rights, rather [sic] it recognises the limits of the individual rights-based approach for *people who have a relational theory of personhood*" (HRD, 2004).

Collective Ethical Stance

The article on informed consent is again grounded in the concept of individual right of responsibility/control/power over one's action. A Pacific ethical view of DNA testing would be that if my DNA contains my genetic ancestry/history, then what right do I have to give consent for what is, in effect, our families' collective knowledge?

Holistic

An example from Hawaii demonstrates the holistic nature of Pacific ethical relationships. In Hawaii, the Monsanto Corporation began experiments in the genetic modification of taro, in collaboration with the University of Hawaii. This seemingly straightforward piece of agricultural research was not seen as such by the local community, which regarded this as a *mana mahele* (a second *mahele*), whereby the company was attacking the mana that is in taro. Because taro is the first born in Hawaiian genealogy,

9 E.g., DNA testing carried out without consent of blood samples collected in the Cook Islands (B. Sykes, *The Seven Daughters of Eve*); cancer research and the complete DNA sampling of the Tongan population (Bear, J.C. 2004. What's My DNA Worth, Anyway?" A Response to the Commercialization of Individuals' DNA Information. *Perspectives in Biology and Medicine*. Vol. 47 (2), pp. 273-289); and the patenting of kava medicinal properties by external pharmaceutical companies (http://www.etcgroup.org/en/take_action/past_actions.html).

the community viewed this research as changing the genes of their ancestors (pers. comm., E. Huffer, quoting Walter Ritte 2005)

(2) Future Directions

There is little public debate, teaching, or research on ethics issues in the Pacific today. Nor are Pacific ethical statements documented and easily accessed by the public. A national university has recently adopted an ethics research policy, and this issue is being discussed at the main regional university. Outside the academic arena, professional organizations (e.g., engineers, accountants, and doctors), the media, and community organizations (Table 1) are putting ethical codes into practice.

Table 1: Ethics Codes Established and Promoted by Pacific Community Organizations

Ethics statement	Agency	How it is monitored, used, and grounded in community
JAWS Ethical Standards	Journalists Association of Samoa (JAWS) was established in 1985 The Ethical Standards set soon after. Applied on a daily basis Printed in papers once a month	• 2001 PINA/PNG Media Council Press Freedom Award • 2000 World Press Freedom Hero Award, Int'l. Press Institute • Gold Winner Int'l. Freedom of the Press Award (supported by index on Censorship) • 1998 Commonwealth Press Union Astor Award for Press Freedom • 1997 Pacific Investigative Journalism Award, UPNG • 1994 Pacific Press Freedom Award, PINA
Vanuatu Cultural Research Policy	The Vanuatu National Cultural Council is responsible for research (see chapter 186, 6 (2) of the Laws of the Republic of Vanuatu) The Vanuatu Cultural Centre is the executing arm of the National Cultural Council and responsible for implementing the Policy.	• Priority research topics • 'Outside' researchers • Applications for research/fees • Traditional copyright considerations • Ni-Vanuatu participation in research and training. • Benefits to community, nation… • Deposit & accessibility of materials • Commercial ventures

The value of any ethics code or framework depends on if they are known about, discussed, agreed to, and supported by appropriate implementing mechanisms, as in the process followed in preparing the JAWS ethics policy and the Vanuatu Cultural Research Policy. Further, it is important that the public be kept informed on these issues and learn the skill of evaluating technological innovations from a Pacific ethical viewpoint. National discussion also provides the entry point for review of universal declarations, such as the Bioethics Declaration.

Building capacity for ethics debate/committees includes actions by:

Universities and tertiary institutions, school curriculums and teacher training institutions- Materials with Pacific perspective to school curriculums and teacher training institutions used alongside the ethics research policies

Health Departments- Links with the New Zealand Health and Disabilities Commission guidelines

Agriculture- In partnership with FAO

An ultimate "first" step would be to establish some form of bioethics committee with a coordinating, advocacy, and awareness-raising role. Such a committee could also connect Pacific countries into global ethics debates and promote publications such as the *Australian Journal of Professional and Applied Ethics* (Charles Sturt University) and the *Work in Progress* journals of the United Nations University.

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Indian Ethics and Contemporary Bioethical Issues*

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Any discussion of Indian ethics is susceptible to either a lack of specificity or over generalization. Often, it is claimed that moral problems have not been pursued consistently nor successfully tackled in India. This attitude can be summarized by paraphrasing Albert Schweitzer:

- There are two fundamental problems in all thought. First is the polarity between life and world affirmation, and life and world negation. Second is the relationship between ethics and these two approaches to life. In the life and world affirmation, humans see the world as having a value per se; something that human beings are expected to preserve and advance. In the life and world negation, the world is taken as sorrowful and meaningless. Rather than seeking to perfect the outer world, human beings should renounce the world and seek to perfect their inner beings. The greatest problem for life and world negation is that it makes no room for an active ethic—it reverts more to inner virtues rather than outer activity. It asks of human beings more a spirit of kindliness free from hatred rather than a life of active love. The Indian approach is characterized as this kind.

This can be attributed to many reasons:

- The nature of concrete moral duties is defined with reference to the social organization of a given location. For example, ethically correct conduct in the city-states of Greece was not necessarily correct in imperial Rome. Hence, in the Indian context, moral actions call for a different connotation.
- The classification of duties and virtues is naturally influenced by the social realities, and anyone who is not familiar with a given social structure is likely to have little intimate knowledge and appreciation of its ethical values. India, with its tradition of castes and classes, postulates different rights and duties to different people. The Brahmanical system of social stratification cannot advocate a uniform code of morals.
- Human life is divided into different stages (*asramas*), and the duties pertaining to different stages naturally vary from one another. For example, the stages of *brahmacharya* (student), *grahastha* (householder), *vanaprastha* (forest dweller), and *sannyasa* (saint) all call for different duties at different stages, even within a single individual.
- Scriptural basis is another point of interest in Indian ethics. The *Vedas*, the earliest scriptural literature of India, are regarded as the ultimate source of all *dharma* (virtue), religion, duty, or law.
- The much-adored distinction between *sreyas* (perfection) and *preyas* (pleasure), with an inclination towards *sreyas*, is a peculiarity of Indian ethics. The ascetic preachers preached that the highest spirituality is synonymous with renunciation of the world. They go to the extent of prescribing a milder discipline for the common person, who has various obligations to fulfil other than contemplation and spiritual practice.
- The doctrine of dharma, which is another peculiarity of Indian ethics, is what is prescribed by the scripture. There are different kinds of prescriptions, like *nitya karmas*, which are duties of perfect obligation. Not performing such duties yields sin. *Kamya karmas* are duties of imperfect or contingent obligation, and are obligations one can skip if they have no desire to gain the fruits of those actions. For example, the aspiration to attain heavenly bliss, or the aspiration to attain objectives like children or wealth. *Naimittika karmas* are contingent and obligatory duties, such as the various sacraments associated with birth, death, etc., which are to be performed when those events occur.

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The view that Indian thought lacks a firm foundation for ethics is reinforced by the following consideration:

- Sankaracharya, the ninth century advocate of the philosophy of the *advaita* Vedanta tradition in India, held that the ultimate reality was unity, and he relegated ethics to a lower level because it involves distinctions. For him, the ultimate goal was liberation (*moksa*), meaning the end of the cycles of rebirth and the realization of the ultimate unity without distinctions. The place of ethics in this scheme is only preparatory to the path of realization, and it has nothing special to offer to affect realization. Further, it is categorically made clear that the liberated human is beyond all distinctions, and, hence, beyond ethics;
- Belief in the doctrine of karma, which says that actions or attitudes are the results of previous actions, negates free will. If all actions are the result of past karma, one cannot be held responsible for what they do: the basic principle of all ethics.

All these points indicate that Indian tradition is ethically handicapped, but there are certain missing links to be joined:

- When it is said that moral obligation rests upon the recognition of specific duties attached to each caste and each stage of life, it is not correct to say that there are no universal duties that every person is expected to perform. For instance, there are certain duties that cut across sectional differences of society. Duties relating to transcendental matters include the abjuration of six deadly sins (lust, anger, greed, infatuation, pride, and jealousy). The renunciation of excessive attachment and hatred of all kinds is commanded for all.

The science of salvation (*moksa sastra*) is central in Indian philosophy. Along with this, there is the science of statecraft (*artha sastra*) and the four objectives of human life (*caturvargas*), or *purusarthas*. Actually, there is something called the "Indian Philosophy of Values." From the standpoint of Indian philosophy, there are two functions of knowledge: one is theoretical, namely revealing the existence of some object (*artha nparichitti*), and the second is practical, namely affording help in the attainment of some purpose in life (*phala prapti*). They are referred to as fact and value, respectively. It is thought that knowledge of facts leads to the pursuit of values. The well-known group of four values is: *dharma*, *artha*, *kama*, and *moksha*, called *purusharthas* (human values) because they represent the ends that are consciously sought by human beings.

There are certain cultural axioms that underlie the Indian view of right action:

- Purity and impurity: purity, or *suddha*, refers to the most desired state of being, and impurity, or *asuddha*, refers to the opposite of purity. As the desired state, purity is most likely to be followed, and as a negative state, impurity is likely to be avoided. This axiomatic principle affects how one lives and what actions are good or bad.
- Renunciation and societal life: asceticism and renunciation is another cultural axiom. Right from the time of the *Upanisads*, the traditions of renunciation and asceticism have been much valued in the Indian tradition. The contradiction between ordinary social life and the value placed upon renunciation may be overcome via the four-fold class system and the four stages of life. At any one point of time, one's *swadharma* of appropriate actions is determined by these two grids of four.
- Along with the value of renunciation, the emphasis placed on the principle of *ahimsa* makes it an essential ingredient of Indian thought. For Gandhi, it was the foundation of human progress. Non-violent resistance requires strength and resolve. It means that one is prepared to suffer violence at the hands of another without retaliation or violent defense. *Ahimsa* is not submission to the will of the evil doer, but is resistance to that will, and involves the hope of changing that will in conformity with truth. It is based on the premise that ahimsa is equivalent to truth (*satya*), and that even if one perishes while implementing *ahimsa*, truth will prevail and be ultimately realized. The principle of *ahimsa* has three dimensions of thought, word, and deed. It should begin in the mind and only then issue appropriate actions. Even though it is a fact that one may witness heated arguments, mistreated animals, or even physical violence on Indian streets, the doctrine of *ahimsa* has influenced the lifestyles of many Indians.

Apart from the above, the modern western approaches to India have mainly focused on metaphysics and epistemology, at the expense of having a blind eye to the ethical issues of modern living. Also, it is a fact that to the modern Indians, ethical issues are not as important as other issues. Yet the in-depth exploration of the ethical foundations within Indian philosophy is important. The "ought" of ethics (*dharma*) is foundational for all Indian thought. The following examples all point to the supreme value of ethics in the Indian tradition: the ideals of human life in this world; one's relation to other human beings; the duties of caste and stages of life; the insistence on the list of bad habits to be broken (*Patanjali*); good habits to be instilled as the requirements for the practice of yoga; and the emphasis that ethical action (*Jaimini*) is inescapable and therefore the supreme governing force of the universe.

Contemporary Issues

- Human rights and women: The place of women in social life has been a much-discussed topic since Vedic times, and has culminated in the Constitution of India assigning all citizens to be equal before law, without reference to gender. Many acts are passed on the ethical principle that women ought to be treated as men are treated, and justice should be blind to gender. But in some cases, these laws might actually mask the negative treatment of women.
- Suicide: Ancient law books consider suicide a major violation of moral law. Still, religious suicide (such as *sati*) is supported. Actually, a debate over *sati* embodies the encounter of tradition and modernity. On the one side, there are those who hold to the traditional place of women in society and family. On the other side, there are those who champion the cause of women and seek to elevate them to equal standing with men. Traditional texts are based on the principle of inequality, while modern human rights perspectives are based on the presumption of equality.
- Abortion: The earliest Indian texts consider abortion a serious crime, and one who extracts the embryo from the womb is seen as an evil doer. This is based on the following concepts:

  (1) the traditional view is that human beings are a combination of spirit and matter. The foetus in the womb is held to possess consciousness and even memories of past lives;

  (2) the axiom of karma and rebirth is against abortion, since such action terminates the possibility of unborn's opportunity to develop and realize the possibilities of life;

  (3) in Indian tradition, sons carry on the family name and perform religious ceremonies at the death of the father.

Hence, the Indian tradition always accorded personal moral status to the embryo/foetus throughout pregnancy. As such, it is held that life begins at conception, feticide is a major sin, pregnancy is a great good, women are worthy of respect and care, and pregnant women are especially to be protected and granted concessions.

In modern India, abortion is legal under certain conditions. A major current debate is over selective abortion through sex determination tests.

Conclusion

In the Indian tradition, ethics has a very long history. Granted, it has tended to concentrate on attitudes of personal cultivation leading to liberation—but it does contain a framework that can be used to address modern issues. This framework can be used to analyse issues such as euthanasia, the environment, gender equality, and medical technology. Although it begs more interpretation, one can presently look into the Indian tradition for meaningful insights into still wider ranges of pressing contemporary issues.

Bioethics and Interdisciplinarity*

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It is well known that the study of bioethics is interdisciplinary in nature. But this important characteristic is seldom discussed in literature within the field. It is my aim in this paper to contribute to filling this gap by presenting a view that is intended more for opening up further discussion and investigation than for presenting a final opinion. I will first begin with a list of questions on the nature of the discipline, and after, a discussion on that nature (disciplinary or interdisciplinary, and what it all means). The paper will conclude with a number of practical recommendations on how a course or programme of study in bioethics should be developed.

There are a number of questions related to the nature of bioethics as an academic discipline, and these questions point to the nature of academic disciplines, in general. Some of the questions are: What kind of discipline is bioethics? If it's interdisciplinary, what is its nature? What are the practical implications of this issue? How should bioethics be taught? And, what should a programme of study in bioethics look like? I will first begin with a discussion on bioethics as a discipline, which I think is the most basic topic and, in fact, is one that defines the course of the answers to the questions.

That bioethics has become an academic discipline on its own is well known. There are now many academic teaching programmes in the field, leading to titles such as "Master of Arts (or Science) in Bioethics", or "Doctor of Philosophy in Bioethics". There are also many conferences in the field, a number of journals, and a growing number of practitioners who call themselves "bioethicists." These professionals are found in bioethics teaching programmess in higher education institutions, and it is these groups who regularly attend bioethics conferences, contribute to bioethics journals, and form professional bioethics associations. Moreover, they can also be found in many areas of the professions; namely, medicine, biological sciences, philosophy, law, and so on.

This all points to a well known fact: The field is, perhaps paradoxically, an "interdisciplinary discipline." On this aspect, it shares the interdisciplinary nature of some other fields, such as cultural studies, area studies, and the cognitive sciences. What these disciplines have in common is that they emerged out of the inadequacy of a particular academic discipline in response to problems that arose out of either a need to gain a comprehensive overview of an area (as in the case of cultural or area studies) or a set of common problematic issues (such as human cognition) that covered information from more than one discipline.

In the case of cultural or area studies, the aim is to gain a bird's eye view, so to speak, on the specific culture or area at hand. Insights and results from several disciplines, most notably the humanities and social sciences, are collected to form a clear picture. The focus in these cases is not the same as that of a traditional discipline. For example, the focus of history is an explanation of an historical event; the concentration is on the past. There is also a commonly accepted method of studying the past that consists of interpreting historical texts. The focus of economics is an explanation of an economic event. The questions asked consist of something like, "What are the reasons behind a country's doing well or not well in economic matters?" Once again, the focus is not actually on the area in question, but on the set of techniques or methods that together define economics as an autonomous discipline. On the contrary, the focus of area studies is not on the sets of methodologies, but on the areas themselves, and the methodologies serve as a means by which a comprehensive view is obtained.

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In the same vein, cognitive sciences emerged out of the dissatisfaction of a number of scientists and scholars in various fields (namely, psychology, computer science, linguistics, and some others) in dealing adequately with human and animal cognition. All these disciplines deal in one way or another with human cognition, but each does so in its own particular manner. In order for a comprehensive view to be gained, these disciplines need to work together, and that is exactly what happened in the late 1980s, when the discipline of cognitive sciences took shape.

Like the other interdisciplinary disciplines, bioethics comprises several traditional academic schools. One finds influence from philosophy, law, medical sciences, and biotechnology in the field. However, bioethics has one important difference from the discussed disciplines: It has a core focus of value evaluation and judgment. The cognitive sciences can be readily considered a branch of natural science, because the focus is on how to explain human (and animal) cognition. The area studies could perhaps be classified as social sciences, because the areas in questions are social or political entities. However, the focus of bioethics is on how one makes informed and rational assessments and decisions related to issues in the life sciences and biotechnologies. As such, this focus differentiates the field from all the natural sciences, which do not naturally concern themselves with value judgments. On the other hand, the topics of consideration—what the value judgments are about—are issues that emerge from the natural sciences. Thus, the field lies precisely at the intersection between the sciences and humanities (with the social sciences somewhere in between). This is perhaps a peculiar aspect of bioethics, which makes it an exciting and important field of study and research.

Because a field is exciting and important, that does not necessarily mean it is easy to manage, or to understand its nature as an academic discipline. In a criticism of interdisciplinary disciplines, Beer has the following to say:

> A man who can lay claim to knowledge about some categorized bit of the world, however tiny, which is greater than anyone else's knowledge of that bit, is safe for life: reputation grows, paranoia deepens. The number of papers increases exponentially, knowledge grows by infinitesimals, but understanding of the world actually recedes, because the world really is an interacting system. And since the world, in many of its aspects, is changing at an exponential rate, this kind of scholarship, rooted in the historical search of its own sanctified categories, is in large part unavailing to the needs of mankind.
>
> There has been some recognition of this, and inter-disciplinary studies are by now commonplace in every university. But will this deal with the problem? Unfortunately, it will not. We still say that a graduate must have his 'basic discipline', and this he is solemnly taught—as if such a thing had a precise environmental correlate, and as if we know that God knew the difference between physics and chemistry. He learns also the academic mores, catches the institutional paranoia, and proceeds to propagate the whole business. Thus it is that an 'interdisciplinary study' often consists of a group of disciplinarians holding hands in a ring for mutual comfort. The ostensible topic has slipped down the hole in the middle. Among those who recognize this, too, a natural enough debate has ensued on the subject: Can an undergraduate be taught 'interdisciplinary studies' as his basic subject? But there is no such subject; there is no agreement on what it would be like; and we are rather short of anyone qualified to do the teaching. Those who resist the whole idea, in my view correctly, say that it would endanger the norms of good scholarship. There is a deadlock . . .
>
> The dissolution of the deadlock within the disciplinary system that I described above has got to be metasystemic, not merely interdisciplinary. We are not interested in forming a league of disciplinary paranoids, but (as Hegel could have told us) in a higher synthesis of disciplines . . .
>
> In the mounting pile of new books printed every year that are properly called scientific, one may take hold of one's candle and search like a veritable Diogenes for a single one answering to the honest criteria I have proposed for a metasystemic utterance. There is only a handful in existence at all, which is not surprising in view of the way both knowledge and academia are organized. And yet, as I have also proposed, herein lies the world's real need. If we are to understand a newer and still evolving world; if we are to educate people to live in that world; if we are to legislate for that world; if we are to abandon categories and institutions that belong to a vanished world, as it is well-nigh desperate that we should, then knowledge must be rewritten (Beer, 1980, p. 64-5).

The idea, of course, is that interdisciplinary disciplines should become more properly disciplinary by creating and maintaining a "metasystemic" discourse that serves to define the discipline in question vis-à-vis others. It is conceivable that these metasystemic discourses will just become a normal discipline on their own, with their interdisciplinary character being lost. In the end, if this idea is followed through, the interdisciplinary disciplines will simply become additional disciplines, with their own set of canons and problematics, curricula, etc.

The quotation from Beer points to a basic problem of interdisciplinary study and research. Being composed of several different disciplines, the interdisciplinary programmes tend to lack a character of their own. While the philosopher has her own image and public persona, created perhaps by the way philosophers typically carry out their work, the bioethicist does not enjoy such a reputation—at least not to the same extent. In Thailand, where bioethics is just beginning to take hold, bioethicists are usually composed of biological scientists and medical doctors who talk about the values of their work, and in many cases do not have the required background knowledge to deliberate fully and efficiently or to communicate their values and deliberations to the public. Hence, the persona of the bioethicist is absorbed by that of the medical doctor, or, in fewer cases, that of the lawyer or the philosopher. Without a character of its own, the discipline tends to lack its own identity. This can translate into many practical challenges, as I shall try to spell out in the course of this paper.

This lack of identity is perhaps one of the reasons why bioethics or any other formerly interdisciplinary disciplines, in general, tend to take on a properly disciplinary character. The way to become a proper discipline is rather familiar: one has to have its own gathering, namely conferences, seminars, and workshops. The group of people who regularly attend these meetings are those who become the core of the new discipline. Then what happens, naturally, is that this group of academics talks and shares research results among themselves, thus creating new jargon that everyone accepts and shares. There is also a set of problems that the newly emerging discipline is devoted to discussing. All these aspects translate into a common methodological framework shared by the group. There are also journals to formally communicate their viewpoints and research results, there is a professional association to institutionalize the discipline, and, in the end, there are teaching programmes to train future members of the group. This is how an academic discipline creates itself.

When psychology was created in the late nineteenth and early twentieth centuries, what happened was that the pioneers of the new discipline saw that they were doing something radically different from their mother discipline of philosophy. Instead of studying the mind through philosophical methods, these pioneers looked at the natural sciences as their model, and imported the methods of experimentation and verification to their field. There was a fundamental shift in the basic principle. Instead of viewing the mind as something unquantifiable that could be studied only through rational argumentation and subjective introspection, the early psychologists believed that the mind could indeed be studied objectively. During its first few years, modern psychology gradually took shape, and when there were enough people subscribing to the same set of methods and assumptions, the new discipline clearly defined itself against philosophy and took off on its own.

Creating a new discipline is as sociologist of science Steve Fuller has argued: The process is a conventional one, wherein a group of scholars starts subscribing to a new set of methods and ideas that define a new discipline. There is no logical proof that these new sets reflect reality more accurately than the earlier ones. This, as is quite well known, is the message of historian of science Thomas Kuhn, who famously argued that what drives the history of science forward is not that the new systems manage to discover reality better than the earlier systems; instead, it is that the new group of scientists gets to define themselves in a different way (Kuhn, 1996). Kuhn calls the process a "paradigm shift." The old paradigms may have served their purposes for a period of time, but when socio-historical conditions change, the old paradigms may become outdated and replaced by a new set. This, as both Fuller and Kuhn seem to argue, does not seem to have anything to do with truth or "uncovering facts."

This means that disciplines emerged out of socio-historical reasons, and not for the traditional, academic reason of better uncovering reality. This has many implications for the interdisciplinary disciplines that we are discussing. According to Fuller, "disciplines are artificial 'holding patterns' of inquiry whose metaphysical significance should not be overestimated" (Fuller, 2005). Furthermore, "the persistent need

for interdisciplinary solutions to disciplinary problems brings out the inherently conventional character of disciplines" (Fuller, 2005). Disciplines are "holding patterns" in that they house a set of books that are held to be classics, or canons, in their field. The "metaphysical significance" of such patterns should not be overestimated for Fuller, because the existence of academic discipline such as psychology or sociology is more a matter of arranging things for the professionals who share canons and methodologies, as said before. Moreover, Fuller argues that the persistent need for interdisciplinary solutions reinforces the fact that the disciplines are merely conventional—they emerged as a result of "marriages of convenience" that grouped a number of people together. Once a group is formed and institutionalized in one way or another, a new discipline emerges.

The significance of all this is that academic disciplines such as psychology, sociology, and others are merely constructions. Hence, they represent the organizational structures of the universities in which they exist more than they represent the need to accurately reflect and explain reality (Fuller, 2000). In this sense, the emergence of interdisciplinary disciplines such as area studies, cultural studies, cognitive

colleagues from other fields. Bioethics is not an easy subject. One reason is that "bioethicists" need to be very well-grounded in their respective traditional disciplines, and on top of that be well-versed in at least the general outline of neighbouring academic disciplines. This is necessary to understand fellow bioethicists from other fields. The university might need to recognize this through methods such as reducing teaching loads and facilitating horizontal linkages among faculty members in various fields. In order for that to happen, the hierarchical structure in many universities, especially the ones in Asia, need to be reconsidered, and a newer system should be put into effect with simplified groupings of faculty members across faculties, schools, and colleges. The grouping of faculty members doesn't need to be permanent. Members of academic departments sometimes feel they are going to be in their own department for their entire professional career. After all, when one regards oneself as a philosopher or a sociologist, their life revolves around that field. But for bioethics that cannot be the case. One cannot be full time bioethicists, at least if the quality of the programme is upheld. One needs to reach out and contact people in academic areas outside one's home department.

My second point concerns the students. Students entering a bioethics programme need to already be well-grounded in one or two traditional disciplines. If students are not well grounded, then they will lack the mooring they need to make sense of the complexities that comprise bioethics. For this reason, I don't think a bioethics programme works very well at the undergraduate level—there needs to be some kind of "home discipline" for the student. But, of course, this does not preclude highly exceptional students who are capable of learning new things very quickly. Indeed, this skill would be much prized in bioethics.

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The Precautionary Principle in Nanotechnology*

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The precautionary principle (PP) is thought by many to be a useful strategy for action. By many others, it's considered useless at best and dangerous at worst. A recent report extends the scope of the principle to include nanotechnology, artificial intelligence, and robotics (Arnall 2003; see also Phoenix and Treder 2004). Here, we argue that, despite what is often claimed, it is a reasonable principle that can be useful.

The general structure of the principle is this:

If *action* (A) has some *possibility* (P) of causing harmful *effect* (E), then apply the *remedy* (R) (based on Manson, 2002). This is a generic formula only, and A, P, E, and R are each interpreted differently in various actual formulations.

A typical example might be:

> If genetically modified (GM) crops have some possibility of harming humans or the environment, then the development of them should be stopped;

Action A is generally some scientific research or technological or other development, e.g., research for and development of genetically modified crops.

Possibility P must be more than a logical possibility; it must be an empirical probability. There must be *some* scientific evidence that A does or can cause E, even if this evidence is very weak. For example, GM crops can cause harm.

Effect E is some serious (perhaps catastrophic or irreversible) harm.

Remedy R concerns the measures that should be taken to avoid or minimize E occurring, e.g., halting or never starting the research.

There are many formulations of the PP. Here are two common ones:

(F1) When an activity raises threats of harm to the environment or human health, precautionary measures should be taken, even if some cause and effect relationships are not fully established scientifically (Wingspread, 1998).

(F2) In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation (Rio Declaration, 1992).

Despite its wide acceptance and intuitive appeal, the PP is not without strong critics. One of its criticisms concerns prediction-making: It is argued that because the PP is a risk-aversive strategy, it will, or does, stifle research and development, and thereby it can deprive humanity of many goods for, at best, dubious long-term benefits. More precisely, it deprives currently living humans of benefits on the presumption that future generations will inherit a better world. The objection is that we cannot know if people in the future will be better off or not if we undertake a particular action, such as halting the development of some product. It is not possible, as the PP assumes, to make reasonable predictions about the future, at least with respect to developments in science and technology (Volkman, 2001).

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Another criticism is that the PP involves a paradox (Manson, 2002); in any particular case where the PP might be applied, there is always more that one action to which it could be applied, and these actions are mutually exclusive.

A third issue concerns the causal link between the action and the effect. F1 states that the principle should be applied even if "some cause and effect relationships are not fully established scientifically"; F2 talks of "lack of full scientific certainty". In other words, the principle should be applied even in cases where it has *not* been scientifically established that harm will be caused by action A. In a sense, most cause and effect relationships are not fully established, if "fully established" means there is no possibility that one will occur without the other. Perhaps it is enough if there is just a possibility of harm; the normal standards that are applied to scientific evidence can be waived if the potential dangers are great enough.

Yet another criticism concerns the nature of the harm, but this can be disposed of more quickly. It should be noted that in the first formulation, any threat of harm calls the principle into play. This could be overbearing. The second formulation modifies this by talking of "serious or irreversible damage": something that seems at least superficially more plausible, but both "serious" and "irreversible" require closer examination. That some damage is serious is uncontroversial. That asbestos is a serious health problem is unlikely to be disputed, but there is a large range of issues that *are* contested. Does the destruction of the last habitat of an endangered species of butterfly constitute serious damage? The answer given would depend on the value allotted to the natural environment. Many would see it as serious, while many others would not. But this disagreement regarding what constitutes serious damage in no way undermines the PP. As noted, in many cases there is widespread agreement that something is serious, and in a large number of cases where there is disagreement, there is room for rational debate. Not all disagreement is based on mere differences in taste.

Irreversibility also poses some problems, but, again, it is not fatal to the PP. While we cannot literally go back and undo what has been done, many events are effectively reversible provided a long enough time frame. Destruction of a natural habitat is not necessarily irreversible given enough time. But, provided the amount of time required for a reversal to be complete, some situations are irreversible in a practical sense. It is this last category that is necessary for irreversibility to play some useful role in the PP.

The first three of these criticisms will be addressed after an examination in the next section of the PP in the context of nanotechnology.

The relationship between action A and effect E seems to not be the same in all discussions of the PP, even if we limit the discussion to its application to nanotechnology. Consider the following:

A. If nanotechnology research continues, there is a possibility of self-replicating robots being developed, and therefore the possibility of the "grey goo" problem (on the grounds that these robots might escape—they cannot be contained).

Suppose that the causal link between A, the research, and E, the self-replicating machines, is well established (which it is not). If action A is taken, then E will almost certainly occur. But suppose, too, that E in itself is not the problem. If the machines are in some way contained or controlled, then no harmful consequences will result. Suppose now that if self-replicating machines were developed (of the type that Drexler [1996] envisaged), then they would have the ability to self-replicate indefinitely, and the grey goo problem would be the result if they were not suitably controlled. If they *were* suitably controlled, no harm might result. Given that in the schematic version of the PP, E is the harmful consequence to be avoided, a better way of stating the situation here is this: Action A causes state S (with some probability), and state S leads to event E (with some probability). In this example, the scientific evidence of the link between A and the harm E would have to be of two kinds: the link between A and the self-replication machines, say, S, would be the evidence that comes from physical sciences. However, the link between S, those machines, and the harm E would need to be established by the social sciences, because it would concern the ability of people to keep the machines contained indefinitely. This seems to make the application of the PP to research into nanotechnology more problematic, for scientists can claim with some justification (although this requires more examination) that what they are doing in itself causes

no harm. What might cause harm is, technically, the misuse of their results, carelessness, or accidents. Additionally—and this is a stronger point—curtailment of the research might very well deprive the world of significant benefits.

B. If nanoparticles are used in products, then there is a possibility that health will be damaged (we do not know all of their effects).

The problem in this case is different from that in example A. In the gray goo example, if self-assembling robots were developed, and if they were not controlled in some way, then it is quite likely that there would be a catastrophe. There is little doubt that humans, and perhaps all life, would be endangered. In the case of nanoparticles, however, it is not known if they have harmful effects or not, but our knowledge of whether or not they do will depend on scientific evidence alone, and not on predictions of human behaviour.

We will now return to the three criticisms discussed earlier. First, predicting is perilous, and some use this fact as an argument against the PP (e.g., Volkman, 2001). It is certainly true that the PP is (or, it is argued that it should be) used in situations in which the harmful consequences of some actions are predicted. If the whole undertaking of prediction is inherently flawed, and predicting is always unreliable, then applying the PP would never be justified. But, clearly, this is wrong. Much of our everyday lives are based on implicitly making predictions and acting on them. Say I currently predict that I will spend the coming weekend in the mountains. I may not, of course, but it is a reasonable prediction. I plan to do it, I have done it before, and there appear to be no overriding obstacles to me doing it. Perhaps what is meant by PP critics is that predicting the effects of new scientific or technological developments is so unreliable that it should not be done. This has some initial plausibility, but it is not entirely right, either. New drugs and vaccines are developed because it is predicted that they will save lives. Huge investments are made by both the public and private sectors in various scientific and technological fields on the grounds that benefits and profits will result. Nanotechnology is being promoted in many countries because of its predicted benefits to humanity. So, there cannot be anything wrong with predicting in and of itself, even if you are making predictions about outcomes of scientific and technological developments. Science and technology depend on it. Predictions must be made with care, yes, but they must be made.

Secondly, does the precautionary principle entail a paradox? Manson thinks so, on one common formulation of the principle. The problem is that in cases when the principle should be applied, it should also be applied to the alternative that it proposes. In order to try to answer this criticism, we will examine what it says more closely. The problem can be set out as follows:

(1) Action A1 might cause bad effect Eb1 (harm eventuates because of A1);
(2) Remedy R1 (don't do A1) stops Eb1 (PP applied);
(3) but, suppose that A1 causes good effect Eg1 (Eg1 eliminates some harm);
(4) then, R1 stops Eg1 (harm eventuates because of R1);
(5) so, if PP should be applied to A1 (because A1 causes harm), it should also be applied to R1 (because R1 prevents an action that would eliminate some harm)

To explain this, we will return to the two previous nanotechnology cases.

First, take the example of the self-assemblers, as described by Drexler. Whether these are possible or not is a contentious issue, but let's suppose that they are, at least in the mid to long term. According to Drexler,

> Assemblers will be able to make virtually anything from common materials without labor, replacing smoking factories with systems as clean as forests. They will transform technology and the economy at their roots, opening a new world of possibilities [63].

Take action A1 to be research for and development of these self-assemblers. A1 will potentially have enormous benefits for humankind and for those who first develop the assemblers. However, suppose, again, that the grey goo problem is real if these assemblers are developed—that is, the hypothetical that the assemblers could get out of control and keep self-replicating until they destroyed the earth. This, undoubtedly, is not so good. Call this grey goo disaster effect Eb1. Because of the potential harm

of grey goo, it is decided to halt research of the self-assemblers; call this remedy R1. This remedy stops the potential grey goo disaster (Eb1). But self-assemblers also potentially have many good effects, as Drexler states above; call these Eg1. Halting research on self-assemblers then stops these good effects, as well. So this halting (remedy R1) potentially causes a great deal of harm. The question, then, is: Should the precautionary principle be applied to R1? It appears that it should, given that the purpose of the PP is to block potential harm. The problem is now that the PP should be applied to both the research for self-assemblers *and* to the halting of that research.

Secondly, take the example of nanoparticles, a much more likely scenario. Nanoparticles are already being manufactured and used in a variety of products, including sunscreens and coatings on bottles and other food containers. This use will produce products that are better in various ways: for example, more effective sunscreens and food containers that better protect food. The problem is that little is known about the effects of these nanoparticles on humans. There is some fear that they could behave like asbestos and cause serious health problems. To date, there is no negative evidence apart from some research that seems to indicate that fish and rats have been harmed by these particles. Here, too, applying the PP would avoid the harm that might be caused by the particles, but applying it would also deprive humans of a number of goods, which may in itself be a harm. So, in theory, the PP should be applied to inaction with respect to the research and development of nanoparticles.

The paradox problem can be avoided in many instances, however, if we talk of credible or plausible threats. We will look more closely in a moment at ways of deciding it is "credible", but for the moment, accept that it can be done. In the gray goo example, the PP should not be applied simply because there is no credible threat. On current evidence, it appears that the scientific problems in making the self-replicating robots are significant. At best (or worst), the ability to make them is far in the future, and at worst (or best), it would be physically impossible to *ever* make them, given the laws of physics. In the second example of nanoparticles, a case can be made that the PP could be applied, but with no paradoxical consequences. Given what is known about asbestos, there is a credible threat of free nanoparticles causing health problems, even though there is currently scant evidence for it. However, halting the development of nanoparticles poses no credible threat. These particles, along with the products in which they are being used and will be used in the future, are not being produced to prevent any great harm. Certainly these products can make life better, but they tend to make already good lives better versus alleviating suffering.

What *is* a creditable threat? A threat will be called credible if there is a reasonable hypothesis that the threat is caused by a particular action, even if there is little actual evidence to support the causal link.[10] There must also be evidence that this sort of hypothesis is a reasonable one, given the circumstances. The hypothesis that nanoparticles cause harm to humans is reasonable given what is known about asbestos, and deserves further testing (and it must be noted that we regularly breathe in nanoparticles without any apparent harm). It is plausible to believe that they might be harmful, even though there is not enough evidence to even say that it is probable. It is less clear that grey goo presents a credible threat. For reasons mentioned earlier, there are serious doubts about whether self-replication of the required type is possible. If this is so, then a hypothesis such as "the development of self-replicating robots will lead to the grey goo problem," while perhaps true, is practically pointless given that the development of these robots is such a remote possibility. But even if the robots could be developed, the hypothesis has a difficulty. Self-replication itself is not a problem; it is uncontrolled self-replication that is, or might be, problematic. If they are developed with built-in controls, if there are no accidents, and if there is no malicious use, they are no threat. So in a sense, there is no credible threat, if we define a "credible threat" as a threat for which there is purely scientific evidence, as opposed to evidence of the manner in which something will be used, or of human frailty with respect to making mistakes. Perhaps a better way of putting it is that in cases like grey goo, a credible threat, in the sense required for the PP, must be spelt out using two hypotheses: one from the physical or biological sciences, linking the action with some intermediary state; and the second from the social sciences, linking that state with the harm.

10 This section draws heavily on Resnik (2003).

Finally, we look at the remedies proposed by the PP. At least in popular discussions, the remedy proposed by the PP to remove some danger usually means halting the research or development, or some other particular action. This is certainly one remedy, but not necessarily the only one. Another might be to do A2, which is A1 with certain safeguards in place, or to simultaneously do A3, which might be research into overcoming the harm that A1 might cause. Yet another might be to develop policies that could be put in place if or when certain products are developed. This could be a sensible remedy in the nanoelectronics case, and even perhaps in the grey goo case. Perhaps this should normally be the remedy in cases where a credible harm is based partly on a social science.

We can now summarise by restating the general structure of the precautionary principle given at the beginning of the paper:

> If an action (A) poses a credible threat (P) of causing some serious harm (E), then apply an appropriate remedy (R) to reduce the possibility of E.

This formulation is plausible, and its application is not trivial; it does make a difference. As we argued, the action must pose a *credible threat* and not just be a logical possibility. First, the hypothesis that the threat exists must be a plausible one given current scientific knowledge, even if no probability can be given. Secondly, the appropriate remedy can be a variety of things. It might be stopping the research altogether; halting or slowing it for a time to determine the seriousness of the threat or to allow time to develop measures to overcome or mitigate it; or looking for alternatives to the initial action. While this is weaker than many formulations and will not apply to as many cases, it is not without merit. For example, if applied to the nanoparticles case, it would require at least a concerted attempt at establishing the risks to health and the environment, and would perhaps slow the development of products until the threats have been properly assessed.

An attempt has been made here to show that sense can be made of the PP. It is a principle with content that can be reasonably applied to certain research, development, or actions. Nonetheless, different contexts will require different analyses of credible threats , which will and require different remedies, as the subject of nanotechnology well demonstrates.

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Philosophical and Practical Reflections of Malaysian Science*

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This paper begins by first examining parts of the Malaysian Science and Technology Policy, then it describes certain scientific endeavours that have called for ethical assessments, and, finally, highlights small bioethical initiatives in the country. At the same time, we will be discussing issues to show the relevance of the "UNESCO Recommendations on the Status of Scientific Researchers" (1974) to Malaysian scientists.

Were we to trace the beginning of national ventures in science and technology in the country, we would see that it started with the establishment of the Ministry of Science back in 1973. Developments in the area later saw the need for the formulation of the First National Science and Technology Policy in 1986.

In recognition of the need to enhance technological developments and to streamline the Science And Technology policy "to the changing environment and realizing the pervasive role of knowledge in the globalised economy so as to meet the challenges of the new millennium," the Second Science and Technology Policy for the 21st Century was produced together with A National Plan of Action in 2003. The national vision for Science and Technology reads as follows: "To become a nation that is competent, confident and innovative in harnessing, utilizing and advancing Science and Technology towards achieving the goals of Vision 2020."

The general aims of the policy include: increasing the national capacity for research and development (R&D); technology development and acquisition; and stimulating the transformation of knowledge into products, processes, services, or solutions that add value to industries as new measures for "sustaining economic development, the improvement of quality of life and national security."

Reportedly, the objectives of the national policy were:

- to increase R&D spending to a least 1.5% of Gross Domestic Product by the year 2010, in an effort to enhance national capacity in R&D; and
- to achieve a competent work force of at least 60 RSEs (researchers, scientists, and engineers) per 10,000 labour force by year 2010 in order to enhance national capability in Science and Technology.

There was also the need to enlighten the society, and to:

> foster societal values and attitudes that recognize Science and Technology as critical to future prosperity [and at the same time] to ensure that the utilization of Science and Technology accords emphasis toward approaches that are in conformity with sustainable development goals including alignment with societal norms and ethics.[11]

In a recent survey of 2,074 respondents conducted by the Business Ethics Institute of Malaysia (BEIM) on the integrity of 15 professions, the public was asked "Who do you trust the most?". Doctors came up first (72%) and teachers second (67%). Interestingly, scientists came out fifth at 53%, just below priests (58%) and professors (60%).[12]

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11 Malaysia. Ministry of Science, Technology and the Environment. 2003. *The Second National Science and Technology Policy and Plan of Action: Competitiveness through Science, Technology and Innovation.*

12 Business Ethics Institute of Malaysia Report. *Sunday Star.* 23 April 2006.

In another survey carried out by the Malaysian Science and Technology Information Centre (MASTIC), the *Fourth Report on the Perception and Attitude towards Science and Technology 1996-1998*, the public showed very high regard for the integrity of scientists. Some of the issues surveyed are displayed in the table below.

Table 1: Public expectations about Science and Technology[13]

Issues	Response by the public (1996-1998%)
Science and Technology makes our life healthier, easier, and more comfortable	82.8-88.9
Most scientists work towards improving life	82.1-81.6
Scientific research is necessary, even though it does not bring about immediate benefits	78.7-80.5
Scientists should conduct health research even if it causes pain to animals	49
New inventions will counteract harmful consequences of technological development	73.5-75.1

The broader scope of the national Science and Technology agenda, in particular, encompasses a wider range of activities that includes the biosciences and engineering, which are identified as prospective areas that could generate wealth in the nation's industries. These are, namely, biotechnology, advanced material science, information and communication technologies, aerospace, energy, nanotechnology, photonics, and pharmaceuticals.

Incidentally, the problem of shortages in the Science and Technology workforce—detected at below 30% across all levels of the science, technology, and engineering areas—urgently called for the consideration of new delivery mechanisms. A series of strategic initiatives to intensify the growth and creation of a critical mass for Science and Technology was recommended. These included drives to encourage interest in the sciences in primary, secondary, and tertiary educational levels such as:

- the adoption of a 60:40 ratio of students pursuing science, technical, and engineering disciplines in schools and universities versus the arts and humanities;
- the change from traditional modes of learning, which were rather examination-oriented and emphasized rote learning, to hands-on and innovation-oriented approaches such as the development of creative thinking and problem-solving skills, also known as problem-based learning (PBL), which are skills invariably found in the study of science;
- the review of current scientific and technical/vocational subjects in primary and secondary schools. This, incidentally, incorporates the move to implement the teaching of science and mathematics in English; and
- the upgrading of the number of postgraduates in the critical areas to at least 10% of the undergraduate population.

Moves to intensify R&D included increasing the number of postgraduate fellowships, and encouraging collaboration with renowned researchers and industries by establishing "Distinguished Visiting Scientist" posts in universities. In addition, there is a need to establish research-centred universities, a move that represents a radical shift from their traditional roles as teaching centres. The Returning Malaysian Scientist Programme (originally proposed under the First Science and Technology Policy), that has since offered several fiscal and non-fiscal incentives to address the "brain-drain' problem, will be revisited so as to make it more attractive to the needs of researchers.

Of interest are two rather radical moves. These are, firstly, to allow more freedom for the industries to

13 Extracted from Table 5.3 Perception and Attitude towards Science and Technology 1996-1998. *MASTIC Report 1999*, p. 58.

contribute to curriculum design and/or review so as to make them more relevant to industry needs and demands and, secondly, to assist scientists to commercialize their research findings and inventions, thus inducing a climate for invention, innovation and techno-entrepreneurship.

The problem is that such capacity-building in R&D endeavours implies increased responsibilities, which may incur increased risks, including inevitable conflicts of interest between the individual scientist and the industry. The age-old reputation of the scientific institution that rests upon neutrality and the noble act of "science for the sake of science" is set to be blemished by financial interests. It is, therefore, important that such aggressive moves to catapult the nation's economic maneuvers through Science and Technology must involve precautions towards the maintenance of a sustainable future. The "challenge to create a developed and fully industrialized nation [in 2020] which is to establish a fully moral and ethical society, whose citizens are strong in religious and spiritual values and imbued with the highest ethical standards…",[14] therefore remains critical.

Rapid advances in new technologies, especially in the field of genetics, are raising serious moral and ethical concerns.[15] As such, various mechanisms are needed to ensure that the development in the sciences and technological areas maintained "safety and regulatory procedures [which are] consistent with acceptable norms and ethics", and should include steps such as:

(1) the assurance of an effective Science and Technology advisory and coordination system;

(2) the development of more efficient information gathering, monitoring and evaluation mechanisms to track the nation's performance in these fields;

(3) the promotion of sound research management practices in all privately run industries and universities;

(4) proper management of problems dealing with intellectual property rights and commercialization of research outputs; and

(5) developing codes of practice for scientists, technologists, and engineers to ensure that the development of Science and Technology is consistent with societal values and ethics.

Such proposals seemed consistent with the national vision that planned to produce a confident Malaysian society, infused with strong moral values.

In line with the objectives and aspirations of the policy, several public seminars and conferences were held, and it is not unusual that the International Science Conference of 2005 had the theme "Science for Humanity." The objectives were not only to review the level of science and technology development in the last fifty years, but, more importantly, to gather ideas about how to maintain a sustainable future for Asia and the rest of the world in view of tremendous and sometimes controversial developments such as stem cell research and human cloning that raise urgent ethical issues. Note that not only must efforts be made to pursue science and technological development for economic growth and for the betterment of human lives, but we must also ensure that developments place emphasis on the importance and future of humanity as a whole.

Such scientific meetings became increasingly regular platforms for talks on workable regulations on Science and Technology activities to enhance transparency and public accountability. Thus, the conference presented not only exhibits and demonstrations of some of the latest advancements in the sciences and various state of the art technologies, but it also had thoughtful dialogues on topics ranging from consumer nutrition needs and the safety of GMO foods to the ethics of human reproductive cloning.

Since 2003, the Malaysian Academy of Science has annually organized the "Science and Technology Management Training Course for Researchers of the OIC Countries." Besides providing opportunities for

14 Malaysian Vision 2020

15 Such concerns were also addressed in the *Kuala Lumpur Declaration for Science and Technology for Socio-economic Wellbeing of the Ummah 1441. OIC Conference on Science and Technology. Science and Technology for Development in Muslim Countries. Facing the Challenges of Globalization* (Kuala Lumpur), 7-10 October 2003.

research collaboration among member countries, participants were introduced to full day workshops on sound research management practices, the meaning of good science, and the philosophy of research ethics. In 2005, such an event that brought together local and foreign scientists, directors and managers, and senior personnel of research and development in science and technology institutions or industries in various countries began discussing examples of ethics codes governing the activity of scientists. These included the 1974 UNESCO Recommendations on the Status of Scientific Researchers, which highlights the scientific researchers' ethical responsibilities and rights, as well as the 1999 report from the Nuffield Council on Bioethics, which shows special procedures for research on vulnerable populations. For many delegates, it was the first time they were aware of such codes, but they agreed that the guidelines and proposed inherent virtues of responsible scientists were especially useful.

The concept of informed consent for special "'vulnerable populations" was discussed and special reference was made to the CIOMS (2002) *Ethics of Clinical Research in Developing Countries*. In particular, "Guideline 32: The application of guidelines in externally sponsored trials in developing countries", as elaborated below, was deliberated:

- Local research ethics committee should be so constituted such that it understands the local community's customs and traditions.
- Representations from members of the community who are able to serve as intermediaries between investigators and participants are needed to determine the appropriateness of any material benefits . . . [and] that they are in line with the community's gift-exchange tradition.

These are specific and vital guidelines, because advanced scientific research endeavours would inevitably progress into international cooperation and, hence, collaborative research. It serves to remind scientists of the importance of public representation in ethical review boards, a subject typically regarded as trivial by multinational research partnership ventures. It is imperative that research partners should understand and respect the local indigenous population and their particular customs, their way of life, and practices. Fair representation can also check against extensive bio-prospecting and bio-piracy, and for this purpose scientists agree that the 1992 Rio Declaration on the Environment and Development as well as the 1996 Council of Europe's Convention on Human Rights and Biomedicine carry the necessary precautionary principles. A point is raised in the 1992 Declaration that "When an activity raises threats of harm to the environment or human health, precautionary measures should be taken even if some cause and effect relationships are not established scientifically."

Even though it is popularly thought that the religious faith of a person, whether he or she is a Christian, Muslim, Buddhist, or Hindu, can offer the virtues and attributes of a good scientist, some delegates voiced the fact that scrupulous scientists often forget the basic virtue of honesty. As such, "intellectual honesty" may be sacrificed to make way for a much-awaited outcome. Results may be manipulated, non-human (animal) samples may be unnecessarily violated, and, often, the undiscerning human participant may be deceived so as to garner unproblematic cooperation and thus quick completion of the research project. While some believe that codes of ethics serve as constant reminders, and some suggest that every scientific meeting must at least engage in the discussion of such codes, others cautiously remark that they may represent western and neo-imperialist instruments designed to control and curb the movements of scientists, especially those of developing countries. The difficulty of acquiring equitable patent rights was cited, indicating a real problem faced by most scientists to this day.

When asked if a Universal Oath for Scientist, as first proposed by the 2001 International Council for Science's "Standards for Ethics and Responsibility in Science", is necessary, there were mixed reactions. Western codes of professional ethics have not been well-received, because they were ostensibly alien to certain cultural values. The Hippocratic Oath, for example, was largely thought improper to read, simply because of the pledges made "In the name of Apollo and other Greek Gods". Would history be repeated, as with past attempts to revise the Hippocratic tradition and formulate codes believed to be more suited to particular cultures and religions? For example, "The Seventeen Rules of the Enjuin," an alternative Japanese code of medical ethics, was prescribed, as they had drawn upon both Buddhist thought and the Shinto tradition (Veatch, 2000). The Islamic Oath for the Physician, which draws upon Quranic ethics, is also thought more suited for the Muslim practitioner (Amine and Elkadi, 1999). Incidentally, this new oath has begun to grace the walls of the clinics of Muslim doctors in Malaysia. However, if

one reflects upon the various dialogues on medical ethics held in the country, physicians never fail to make reference to the old Hippocratic Oath as the single most important source of ethical guidance for doctors. It has been remarked that even though the oath does not depict the *tawhidic* paradigm, that is, the belief in one God, nevertheless, it contains several intrinsic qualities that can be used as guidelines for the Muslim physician (Mas'ud, 1999). In addition, it is well known that past great Muslim physicians such as Al-Ruhawi often cited Hippocrates alongside Galen and Aristotle as authorities in the actual practicalities of medicine.[16]

While still on the subject of adopting western-made guidelines in medicine, it is necessary here to point out that the "Georgetown Mantra" as the principles of "autonomy, beneficence, and justice" are popularly called, has been repeatedly mentioned in a favourable way in various local meetings.[17] It is thought that they represent an all-encompassing guideline to ideally be made the ethical standard in all medical transactions. These same principles, therefore, may be translated adequately to outline the scientists' duty to the public. Even though it is impossible to see the scientist having direct communication with the layperson like in a doctor-patient relationship, accountability to the safety of the common people and the environment invariably sums up the collective meanings of autonomy, beneficence, and justice.

Early this year, the government began to emphasize the importance of biotechnology, which is thought to be foremost beneficial to farmers, as it would contribute towards enhancing their agricultural produce and exploit the country's rich biodiversity. In the past, attempts to change the properties of organisms was confined to traditional methods such as cross-breeding and interbreeding between close relatives of the plant and animal kingdoms. Today, genetic modification technology can use all existing genes of countless organisms to bring about changes in the genome. It is, therefore, possible to enhance the desirable qualities of a fruit, vegetable, or animal through gene transfer techniques.

Hence, aggressive research and development plans were forwarded that saw the needs to not only accelerate human resources development in this enterprise and intensify the building of supporting infrastructure, but also to develop a comprehensive commercialization plan. It should be noted that the National Biotechnology Programme (2001) to oversee research in biotechnology and biodiversity was earlier developed by the then Ministry of Science, Technology and Environment.[18] A National Committee on Biotechnology and Biodiversity Policy was simultaneously formed to address related ethical concerns, and, subsequently, a Biotechnology Policy was drafted in late 2002. The policy, officially launched in April 2005, identified nine thrust areas.

If one looks closely at these strategic thrust areas, one would agree that they are in tandem with the UNESCO Recommendation No. 8, which proposes that "creative activities of scientific research should be promoted in the national science policy,"[19] as well as Recommendation No. 20, that "moral support and material assistance conducive to successful performance" must be established.[20] The nine emphases of the biotechnological endeavours included steps to establish biotechnological centres of excellence; apply competitive "lab to market" funding; provide incentives to encourage committed participation from academia, private, and government-linked companies; assist in the commercialization of health-related natural products and bio-generic drugs; and increase opportunities in bio-processing and bio-manufacturing. Not only are biotechnological investments encouraged from the private sector, but regulatory changes look set to overcome researchers' past predicament in ensuring that they gain a fair share in the ownership of intellectual property and in the monetary rewards derived from collaborative works with institutions and investors. Aggressive plans for the development of human power in biotechnology was dubbed a "national mission," and they seem consistent with the UNESCO Recommendations, which demonstrate that "science and technology are not activities to be carried

16 The reader can verify this from various books on the history of science in Islam. For a good start, refer to: Sarton, G. 1945. *The History of Science* (Baltimore), Williams & Walkins, Vol. 1-3.

17 Consider, for example, Joint Commonwealth Medical Association Trust (ComMAT) and the Malaysian Medical Association Consultation and Conference on Medical Ethics and Human Rights. Penang, Malaysia. 18-20 October 2001.

18 Now known as the Ministry of Science, Technology and Innovation

19 UNESCO *Recommendations on the Status of Scientific Researchers.* Recommendation No. 8, 1974, p. 3.

20 *ibid*. Recommendation No. 20.

out in isolation but part of the nation's integrated effort not only to set up a society that is just, but also more humane by assisting the scientists and funding their training and specialization programmes." It is clear that with the new policy, individual scientists do not need to solicit funding and external grants independently, as they previously had to. The move reinforces the proposal that "each Member State should strive to use scientific and technological knowledge for the enhancement of the cultural [sic] and well-being of its citizens, and to further the United Nations ideals and objectives." (xx source)

It is well known that expected benefits of biotechnology can be tremendous, not only to plants, animals, and humans, but it will also mean new value-added industries and, thus substantial economic growth for the country. Yet, negative consequences are also anticipated for all living things and the environment, as well as for society and future generations. This is the inherent case with the use of any new technique, new drugs, and new chemicals (e.g., additives) in food. Some consequences may not be easily foreseen, thus lending a sense of uncertainty as to how the future will look. Consider, for example, the scale and degree of the variation of traits or properties in organisms resulting from genetically modified plants and animals, and, subsequently, the large scale disturbances in ecological and biological balances. In the last five years or so, the very idea of eating GM (genetically-modified) foods has raised consumer concerns. So it was upsetting for many listeners when a young scientist brushed aside these fears on national TV by callously likening the risks of eating GM foods to the risks of a pedestrian being hit by a car. Perhaps the subject of risk communication should be taught to biotechnologists so as to gain public support and trust.

One must not forget that when in vitro fertilization (IVF) was introduced in the 1980s as a new artificial technique in reproduction, it was initially condemned as "unnatural",[21] as disrupting the traditional family unit (in cases of surrogacy) and involves the "murder" of many unborn children. All these fears have subsided as techniques have improved in the last 20 years and as biomedical technology advanced rapidly, some of which has proved beneficial. Previous ethical objections regarding the production of "designer children" were later displaced by awe and admiration with the birth of healthy babies that had specific disease-carrying genes removed while in their embryonic stages. Within these years, countless dialogues, public lectures, seminars, and conferences showed not only active interest in the ethics of modern science and technology, but they also indicated that there was urgency for the scientists to show accountability and integrity before an increasingly well-informed public at all times.

Perhaps such value-laden developments may have also induced scientists and practitioners to voice concerns over the need to establish appropriate local guidelines, review old ones, and draw up proper legislation to manage research. For example, the Malaysian Medical Association Code of Medical Ethics was adopted in May 2001 at the MMA 41st Annual General Meeting.[22] The Code indicates deep concern over developments in the medical sciences that almost always needed extensive and often invasive research on patients. It carries an appropriate guideline on the proper attainment of informed consent as follows:

> Section 10. Clinical Research:
>
> In any research on human beings, each potential subject must be adequately informed of the aims, methods, anticipated benefits and potential hazards of the study and the discomfort it may entail. He or she should be informed that he or she is at liberty to abstain from participation in the study and that he or she is free to withdraw from the study at any time. The practitioner should then obtain the subject's informed consent, in writing (Malaysian Medical Association Code of Medical Ethics).

The guideline included statements that aim to dispel any notion of public indifference, but was worded in a rather vague and awkward manner:

> A medical practitioner shall use great caution in divulging discoveries or new techniques or treatment through non-professional channels. Practitioners should ensure that research results are first communicated to appropriate peer groups so that a balanced view can be obtained before communication to the public. . . . [And] communication of such a discovery and new

21 If one remembers arguments by Leon Kass and Paul Ramsey.
22 This replaces earlier codes reportedly drafted in 1975.

techniques to the public should be through a professional body after they have been reviewed and generally accepted by the profession. The results of any research on human subjects should not be suppressed whether adverse or favourable (Malaysian Medical Association Code of Medical Ethics).

It has been noted elsewhere that there are five guiding principles that promote the development of a sustainable future. These are outlined below:

(1) Living within environmental limits
(2) Ensuring a strong, healthy, and just society
(3) Achieving a sustainable economy
(4) Promoting good governance
(5) Using sound science responsibly

"Responsibly sound science" has been defined as "ensuring [that] policy is developed and implemented on the basis of strong scientific evidence, whilst taking into account scientific uncertainty (through the precautionary principle) as well as public attitudes and values."[23]

Public opinion and sensitivity to the values of citizens of Member States, therefore, matters in the practice of science. The Malaysian public consists of people with diverse cultural and religious backgrounds, and, as such, the thrust of their thoughts on any ethical problem on biotechnology is unlikely to be typical to that of Western countries. For example, the American culture emphasises the value of individual autonomy. As such, autonomy has become the yardstick for the assessment of many ethical problems that involves human beings. On the contrary, Chinese culture emphasises the value of family and communitarianism, rather than individualism. Islam emphasises the preservation of family lineage and life while ensuring public good in all its developmental endeavours. Although fundamental principles may vary between cultures, more often than not, all four major religions tended to agree on a common set of ethical views.

This was evident when scientists congregated with officials from all the four major religions in the country (Islam, Buddhism, Hinduism and Christianity) to discuss religious concerns and draw up consensus statements on the ethical bearings of technologies such as IVF, pre-implantation genetic diagnosis (PGD), organ transplants, and human cloning. For example, the interfaith discourse on the ethics of organ donation and transplantation achieved a consensus that organ donation can suitably be regarded as an act of charity.[24] Similarly, the dialogue on the ethics of human cloning also struck a common argument based on the belief in the sanctity of the marriage institution.[25]

Against this background and the fact that science is increasingly seen as a powerful commercial enterprise, I will now begin to discuss the importance of the 1974 UNESCO Recommendations. It must be foremost laid down that the Recommendations is actually an instrument for the perceptive Governments of Member States of the United Nations to give appropriate recognition to the scientist profession, and to value scientific knowledge in itself. In other words, scientists stand to benefit a great deal if governments take full acknowledgment of the said Recommendations.

I must say that simple ignorance is contusive to mistrust, and there is a Malay saying, "*tak kenal maka tak cinta,*" which basically means that "it is impossible to love anyone [or anything] if you do not know them thoroughly." It is, therefore, worthwhile for scientists to ponder over the Recommendations carefully. For instance, the rights of scientists practicing in developing countries is appropriately addressed, as there exist an emphasis upon "fair status for those who perform research . . . taking due account of the responsibilities inherent in and the rights necessary to the performance of that work." The Recommendations also brilliantly caution the reader not to use the document as an all-encompassing instrumental guideline for scientists, but rather in complement to regional and local standards and legislations; it cites several other texts for scientific and other workers in its Annex section.

23 UK Government Sustainable Development Strategy. *Securing the Future* (London), Cm646. HMSO. 2005, p. 16.
24 Organ Transplant is a Sensitive Process. *Utusan Malaysia.* 25 April 1997. Decree Soon on Organ Donation: Debate on Ethics, Newly Set Up Panel to Iron Out Details. New Straits Times. 8 March 2003.
25 Public Conference on Reproductive Human Cloning. Kuala Lumpur, February 2002.

Recommendation 14 carries important notes on the civic and ethical aspects of scientific research. A close reading of sections (a) to (d) demonstrates that they actually complement essential Islamic ethics:

> Member States should seek to encourage conditions in which scientific researchers, with the support of the public authorities, have the responsibility and the right:
>
> (a) to work in a spirit of intellectual freedom to pursue, expound and defend the scientific truth as they see it;
>
> (b) to contribute to the definition of the aims and objectives of the programmes in which they are engaged and to the determination of the methods to be adopted which should be humanely, socially and ecologically responsible;
>
> (c) to express themselves freely on the human, social or ecological value of certain projects and in the last resort withdraw from those projects if their conscience so dictates;
>
> (d) to contribute positively and constructively to the fabric of science, culture and education in their own country, as well as to the achievement of national goals, the enhancement of their fellow citizens' well-being, and the furtherance of the international ideals and objectives of the United Nations (UNESCO Recommendations on the Status of Scientific Researchers, 1974).

Firstly, section (a) alludes to the "objectivity of scientific knowledge," which is encouraged in Islam and must be pursued and upheld at all times. The Prophet (pbuh) once prayed that he be given clear truths about nature: "O God, show me the world as it really is." Secondly, (b) emphasizes that unethical means or the subjecting of animals and human beings to unfair treatment in research must never be supported, even though benefits may be substantial. The third recommendation allows the scientists unrestricted freedom to anticipate dangers or actions that have the potential for a conflict of interest, and it allows uncertainty as a valid reason to avoid or discontinue research. Finally, the last recommendation instills a sense of patriotism, namely, the desire to improve or upgrade one's livelihood and the lives of their countrymen, which should be in line with international aims. The scientist is warned that anything other than this is dubbed as "subversive research." Subversive research would be destructive to the environment as well as to humankind. According to Islam, this includes altering the human genome. One of the five purposes of the Islamic Law, *Shariah*, is "the protection of family lineage and progeny." Similarly, Article 13 of the Council of Europe's 1996 "Convention on Human Rights and Biomedicine" also has useful precautions: "An intervention seeking to modify the human genome may only be undertaken for preventive, diagnostic or therapeutic purposes, and only if its aim is not to introduce any modification in the genome of new descendents." (Convention on Human Rights and Biomedicine, 1996, Article 13)

In 1990, the importance of ethics education was identified. This is in line with Recommendation No.10, which emphasises the meaning of a good scientist and a moral one: "Member States should have regard for the fact that effective scientific research calls for scientific researchers of integrity and maturity, combining high moral and intellectual qualities."

Incidentally, the Science Faculty of the University of Malaya created a three credit *Introduction to Ethics* course which was offered in 1995. In 2000, they organized a Workshop on Professional Ethics and Critical Thinking Skills in the Sciences for science professors and lecturers. The workshop was conducted with interactive discussions on the philosophy and sociology of science, the freedom and limitations of scientific inquiry, scientific misconduct and the integrity of the profession, and the importance of ethics education for future scientists.

The objective was to introduce an integrated set of courses on ethics, which includes the subject of "Professional Ethics for Science Undergraduates." It was later incorporated into a structured module, which complements the pure hard-science subjects that cover all three years of the students' educational years in the faculty. Table 2 briefly represents a typical course structure.

Table 2: Integrated Course Structure with Components in Ethics

Year taken	Name of course	Compulsory/Elective	Credit Hours
I	Introduction to Professional Ethics	Compulsory	2
I	Philosophy and History of Western Science	Compulsory	2
II	History of Islamic Science	Compulsory	3
II	History of Chinese and Indian Science	Compulsory	3
II	Ethics in Science and Technology	Elective	3
III	Environmental Ethics	Elective	3
III	Issues in Bioethics	Elective	3
III	Applied Ethics	Elective	3

The total credit hours offered by the subjects constituted at least twelve credit hours of the full 108 credit hours that students needed to acquire a Bachelor of Science Degree. It was believed that an understanding of the various subjects was sufficient to produce a graduate that would not only become a skilled scientist, but who would also be aware of a deep sense of responsibility for the well being of the public and the environment, and who would be ethically competent to address various ethical issues that come their way, whether in the university laboratory or later in their career years. Most importantly, it was impressed upon the students that the nature of the study of science and the uniqueness of its research methodology, which gives credence to the profession in its insistence upon results that are based on objectivity.

The detailed course objectives that are set out for the students are, primarily, to make them understand and respect fellow students, researchers, teachers, and lecturers, as well as the common people of Malaysia with different religious, cultural, and social values. As such, courses on the history of Islamic, Chinese, and Hindu sciences would present enlightening knowledge of their respective and diverse heritage in the sciences. At the same time, the courses reinforce respect for the values each of tradition. By reading Recommendation No.13, we see that it empowers the scientist to think about others before himself or herself, and that the scientist is part of a larger whole. This instils a sense of responsibility and humility:

> Member states should bear in mind that the scientific researchers[']{} sense of vocation can be powerfully reinforced if he is encouraged to think in terms of service both to his fellow countrymen and to his fellow human beings in general . . . to express encouragement for scientific research and experimental development performed in this broad spirit of community service. (UNESCO *Recommendations on the Status of Scientific Researchers*, 1974).

The remaining objectives of the curriculum are: to develop a selfless attitude towards the both the scientific and common community; to adhere to ethical standards in generating information for scientific research, reporting, and writing; and to encourage the desire to work effectively as a team with other researchers, technicians, and other groups.

The Department of Science and Technology of the Faculty of Science was then entrusted to coordinate the teaching of the subjects. The course on "Professional Ethics" was exceptional in that it recruited all professors from the Departments of Biology, Physics, Chemistry, Geology, and Mathematics on a rotational basis to conduct the lectures. The problem-based learning method was incorporated, whereby case studies of ethical issues in the practice of science, such as scientific fraud and misconduct, human and animal experimentation, and environmental concerns were given to students. At the end of fourteen weeks, after independently seeking appropriate literature, sample data, and supporting documents, students argue their cases in front of the class, using multimedia presentations. This non-traditional mode of learning actually made students learn more than they typically would have through the normal lecture-based learning and notes-taking method.

Lecturers admitted that the course actually summons them to seriously think about the ethical aspects of their profession, in addition to giving the students a personal look at the trials and tribulations of the work of scientists. Some lecturers searched the libraries and even began reading ethics publications, such as the *Encyclopedia of Bioethics* by Warren T. Reich. Most lecturers believed that there is no need for a local code of ethics, because science is essentially a universal enterprise, and all scientists should abide by a common code of ethical practice. Others, meanwhile, believed that the working guidelines[26] that they follow are more useful than any code of ethics, and they believe that the international scientific societies they belong to already have particular working ethics guidelines that are better tailored to their specific field of study, e.g., the "Chemist Code of Conduct." Still, some scientists specifically pointed out international agreements such as the 1992 United Nations Convention on Biological Diversity, which addresses more pertinent and practical issues. The presence of local ethics committees that review new project proposals were also deemed sufficient to check against the misuse and abuse of scientific knowledge.

If the UNESCO Recommendation is to be effective, it must be brought to the attention of governments (Ministers of Science and Technology) to impress upon the scientists the need to read and understand the purpose of its contents and, hence, ensure that the scientific cause proposed by member states is in line with the various instructions that were laid down. Codes of conduct might sound restrictive when one thinks about them, but it must be brought to the attention of those involved that this particular set of recommendations is not simply a set of rules about dos and don'ts; it also compels governments to recognize the importance and seriousness of the scientific profession, and it suggests incentives that appraise the status of professional scientists. Otherwise, it will remain, as it has been for the last thirty years, simply an academic document, relevant only to those who specialize and study the philosophy of ethics when, ironically, it was foremost intended for scientists.

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26 For example, guidelines on the release of GMO products, guidelines on human embryo experimentation, guidelines on the disposal of chemical waste from experiments, guidelines on the handling of animals in experiments.

High Tech Neuroscience, Neuroethics, and the Precautionary Principle*

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High Technology—Introduction

We live in a world in which technology plays a significant role in all aspects of our lives, and where existing technologies are constantly being improved, or replaced, by more sophisticated and powerful ones. Technologies, all by-products of science, have redefined how we live, work, fight, relax, and communicate with one another. Modern humans are acquiring ever more sophisticated machinery to serve differing social, economic, and political objectives. On the whole, science is value free because, from the values point of view, science is all about facts. But its application imparts value and, as a consequence, gains socio-ethical significance. Technology is versatile and can be conveniently adapted and applied in ways other than its intended purpose or purposes. In addition, its intended application may have unforeseen risks that carry adverse long-term consequences. Major concerns relating to the development and application of "ground-breaking" technology include damage to the environment, injury to human health, invasion of privacy, issues relating to socio-economics, justice, and equity, and infringement on religious beliefs. To these above concerns we can add those arising from recent developments in high tech neuroscience, where acquaintance with the principles of bioscience ethics and bioethics seems critical.

Bioscience ethics can flexibly facilitate free and accurate information transfer from applied science to applied bioethics. Bioscience ethics' major elements are: increased understanding of biological systems; responsible use of technology; curtailment of ethnocentric debate; and greater awareness of new ecological/medical insights. By reconnecting the traditional disciplines of science and ethics, it becomes possible to incorporate the best of society's traditional/cultural ethical principles, reject misinformation, and bypass fruitless, arcane deliberation (Pollard, 2002).

The Precautionary Principle

The precautionary principle is a rule about handling uncertainty in the assessment and management of risk. This rule recommends that when deciding about actions, a cautious (or precautionary) approach should be taken in the face of uncertainty, particularly when dealing with human health and the environment. The idea behind the principle is that appropriate action should be taken to avoid the risk of serious and irreversible damage to human and environmental health, but it does not mean that no action should take place if there is identifiable risk. The principle ensures that in circumstances where our best predictions turn out to be wrong, it's better to have erred on the side of safety; that is, forgoing potential benefits of a particular technology is better than experiencing harmful consequences from failing to predict the risks.

The precautionary principle emerged in the 1970s, and is currently invoked in numerous international laws, treaties, and protocols in, for example, environmental management, control of toxic chemicals, food standards, fisheries management, species introductions, and wildlife trade. The overarching aim is to support ecologically sustainable development in managing natural resources, and to conserve biodiversity while continuing to develop as an economy. The principle can, however, be equally called upon to assess risk-benefit equations posed by high-tech medical applications.

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The present paper centres on recognized advances in brain-probing technology, and acknowledges that modern neuroscience raises unique ethical questions that demand a cautious (or precautionary) approach in their application.

Mapping the Field

Modern brain imaging began in the 1970s with computed axial tomography (CAT) scans, and many advances have since been made. In the earlier days of neuroimaging, studies focused on structure-function relationships in the brain, and organization of the primary sensors and motor regions of the brain are now particularly well understood. Today, neurological studies probe at our deepest thoughts, define our complex cognitive behaviours, and judge our rational decision-making and consciousness. Neuroimaging reveals the structure of the living brain through technologies such as computer-assisted tomography (CAT) scans or magnetic resonance imaging (MRI). Brain function is revealed through positron emission tomography (PET) scans, single photon emission tomography (SPECT) scans, or functional magnetic resonance imaging (fMRI).

In neural systems of the brain, information is represented by patterns of activity occurring over specific populations of neurons. Different brain regions have evolved to perform different specific tasks, so each region of the brain may perform its computations in different ways. By recording electrochemical activity (neuroimaging) across the brain, it becomes possible to establish normal levels of excitation corresponding to sleep, rest, and various forms of wakefulness. Brain scans can identify early signs of brain disease and risk factors for mental health. Understanding the encoding of information in neural populations is important, both for understanding the fundamental processes underlying brain function and, by learning about normal function, to understand the behaviour of the injured brain suffering from stroke, generative disease, and congenital malformation, for example. In practical terms, knowledge from brain-interpreting science has been applied in neuro-protection (i.e., safeguarding CNS cells from further damage after injury), in neuro-repair (i.e., developing therapies to help the body repair damaged CNS cells), and to develop devices which harness any remaining neural potential to control brain-machine interfaces (i.e., neural prosthetic devices). Future applications will, of course, still concentrate on cure, prevention, and therapy, but they will also focus on reading neural organizations that drive normal and deviant human emotions.

Neuroethics

In response to neuroscience's growing array of technological developments that are capable of monitoring and manipulating the human mind, the emerging field of neuroethics is gathering force. Neuroethics was formally defined in 2002 at the landmark neuroethics conference in San Francisco as, "the study of the ethical, legal and social questions arising when scientific findings about the brain are carried into medical practice, legal interpretations and health and social policy." In practice, neuroethics deals with the pros and cons of research conducted on the brain, as well as the social, legal, and ethical implications of treating or manipulating the mind. When dealing with powerful technologies, questions of need, control, motive, and profit have to be identified and evaluated. For instance, some products such as brain scans, which identify early signs of brain disease and risk factors for mental health, serve obvious medico-*social* benefits, while others, such as technologies created to manipulate human cognition, are less straightforward, and may double as skilfully disguised political tools. Further, when evaluating well-being over the long-term, ethical accountability may require wider forethought, which could include maintaining the well-being of a subsequent generation of children. Thus, in the real world, reaching consensus requires a complex set of interactions among researchers, investors, medical professionals, patients and their families, and the community, at large.

The profit motive may not sit well with, for example, community forethought about what kind of technology is acceptable and what kind is not. But when it comes to high tech research, the money needed to fund these projects is typically out of the range of individuals or small groups, which means financial support is usually made available by governments or multinational companies. Developing new technologies also involves companies legally guarding their research and development through secrecy and patenting. Controlling and monitoring this mix to ensure that society's ethical and legal expectations are met is important, but complex. A sub-sample is described below.

Finger Printing the Human Mind

Current advances in neuroimaging can interpret personality, desires, and may even "see" a state of mind (e.g., racial attitudes) of which one is unaware (Eberhardt, 2005). Future advances will provide insights into individual traits such as intelligence, cognitive abilities, personality characteristics, and genetic predisposition to, for example, violence, addiction, and mental illness. Specific neuroimages may also predict the onset of particular neurodegenerative diseases, such as Alzheimer's and Parkinson's. Other lines of innovative research are already well placed to access the mental processes involved in recalling a memory, whether true or fabricated, and assist neurologists to differentiate between the two. For example, brain fingerprinting techniques can reveal if an individual is lying. But if a truly accurate lie detector were deployed and brain fingerprinting became established as a forensic tool, current privacy guarantees might not provide enough protection against screening requests from courts, the government, the military, or employers. In these circumstances, the precautionary approach is critical because physiological measures, especially brain-based measures, possess illusory accuracy and objectivity. Therefore, instrument accuracy and interpretation needs to be well-established and monitored. Consumers will have to be sufficiently informed to correctly balance advantages (such as prediction of the onset of a particular disease leading to treatment) against disadvantages (such as misdiagnosis, inappropriate treatment, and breaches of privacy). Ongoing advances focus increasingly on ways that basic brain processes can provide useful information about the subtle functions that make us individuals. For example, certain neuroimaging technologies are improving the skill-base for making predictions about an individual's future health. Scientists are learning to read how different image patterns, taken under varying circumstances, correlate with different future conditions or behavioural tendencies.

Since modern neuroimaging faces the common bioethical considerations of privacy, confidentiality, and the misuse of information, the ethical considerations are very similar to those associated with the human genome debate. There are social implications of the availability of personal information, particularly relating to future behaviour, to the wider community. Accountability issues about a patient's medical history are especially relevant here: they extended to include future health prospects, which might involve a wider circle of kin and children. Radiologists who use predictive testing are faced with long-standing ethical issues, particularly in the arena of psychopathology, and it isn't always in a person's best interest to have such information available to others.

Neural Prosthetic Devices

Scientists have uncovered brain functions that would help in the development and application of thought-controlled machines—that is, brain-machine interfaces enabling paralyzed people to move and communicate simply by thinking (Andersen *et al,* 2004a&b; Rizzuto *et al,* 2005). Prosthetics research focuses on recording hand trajectory signals from the brain. Recordings from these cells are "decoded" to control the trajectories of a robotic limb or a cursor on a computer screen. For instance, a patient could navigate a wheelchair or use an LCD interface to type a letter. In pioneering experiments, implants in monkey brains successfully picked up brain signals and sent them to a virtual robotic arm, which, driven only by the monkey's thoughts, carried out reaching and grasping movements on a computer screen (Lebedev *et al* 2005). In other experiments, both humans and monkeys have had their brains wired so they could move cursors on computer screens just by thinking (Sanchez *et al,* 2005). Early research has focused primarily on the identification of specific areas of the brain directly responsible for the control of movement; that is, the primary motor cortex (the brain region that controls voluntary muscle movement). But more recent experiments have identified that the ventrolateral prefrontal cortex, located near our temples, is the region involved in the processing of spatial information related to movements we are about to make (Rizzuto *et al,* 2005). This discovery is important, as it has heightened success opportunities by harnessing the prefrontal cortex for better neural prostheses development. The prefrontal cortex is less hardwired, enabling it to smoothly select appropriate sensory information to achieve the desired objective.

Ongoing experiments significantly advance the effort to devise thought-controlled machines. This technology could greatly benefit people are paralyzed or have lost control over some physical movement.

Post-Traumatic Stress Disorder (PTSD)

Memory gives our lives a sense of continuity and meaning by making it possible for us to learn from experience, to cultivate long-term relationships, and to treasure joyful times. But memory also brings pain. In the extreme, traumatic memories can bring on anxiety states such as post-traumatic stress disorder (PTSD). PTSD is a psychological syndrome that develops in about 20% of individuals after exposure to life-threatening situations such as combat, rape, or natural disaster. The major symptoms include experiencing the event through intrusive recollections, flashbacks, and nightmares, as well as heightened anxiety, emotional numbing, and avoidance of reminders of the trauma. All of these symptoms and their behavioural responses are normal reactions to distressing events, but in the majority of people exposed to trauma, the symptoms subside with time. With PTSD, the symptoms do not fade: rather, they persist indefinitely for years, decades, or a lifetime.

The body's natural tendency to enhance the storage of emotionally-laden memories has important survival value. In dangerous circumstances, we will typically experience emotions such as fear to help us respond appropriately to threats, and avoid similar situations in future. In short: life-threatening situations propel the body and mind to fight for survival by inactivating all non-essential activity and emotions in order to channel the entire available energy to staying alive. This adaptation involves the stress response—the so called "fight or flight" mechanism that is crucial for survival. Stress hormones such as noradrenalin are released from the brain stem and reach the amygdale, which instructs the memory-processing hippocampus to remember that experience clearly. However, in individuals whose stress response is over-reactive or has to be sustained over long periods of time, their hyped up body spells disaster for physical and mental health.

A Pill to Forget

Neurobiologists are working to understand the underlying mechanisms in the brain that encode new memories and store life-sustaining knowledge. They are well placed to appreciate the ways the brain normally keeps unwanted memories at bay (Anderson *et al,* 2004; Ockner, 2004). It looks as if for PTSD sufferers, each recall of the traumatic memory triggers an exaggerated physiological response that further consolidates the traumatic memory by wiring it more strongly into the mind. Because memories run on chemicals, they can be altered by chemicals. Applying this knowledge, researchers are now experimenting with drugs that either weaken the emotional hold of traumatic memories, or prevent newly formed memories from becoming destructive to those with a predisposition for anxiety disorders.

A commonly used class of drugs, the ß-blockers, has the ability to interfere with the way the brain stores memories so that they can be effectively deployed to dampen or eradicate a perceived overreaction to a traumatic event. Administered within about six hours of a traumatic experience, sufferers of traumatic stress disorders can prevent the distress associated with the condition (Giles, 2005). Alternatively, the drug can be administered retrospectively (therapeutic forgetting) to blunt the panic surrounding an existing traumatic memory (Strange & Dolan, 2004). Beta-blockers (short for ß-adrenergic blocking agents) are drugs that interfere with, or "block", the function of certain stress-mediated neurotransmitters in the brain, such as noradrenaline and adrenaline. Because ß-blockers lower blood pressure and the heart rate in general, they have been prescribed to treat high blood pressure and some forms of heart disease. Propranolol and its congeners are ß-blockers commonly used for these conditions.

As described above, the body uses stress-mediated neurotransmitters to initiate emotional reactions that best prepare the body to deal with an emergency, perceived threat, and survive through learned experience. But not all approve of preventing anxiety disorders with drugs, especially when administered before predicted traumatic times. The concern is that memory-erasing medication might risk entrenching antisocial behavior by removing emotions like empathy, remorse, and guilt, which typically curb the excesses of an activated "fight or flight" response. For example, would we want to give soldiers memory-blunting agents on the eve of combat to fortify the extinction of unwanted memories? Would this not risk accelerating atrocities in an environment where killing civilians and children are options? Might this not medicate away shame or guilt that might occur from past misdemeanors, which

would otherwise prevent future wrongdoing? Among practical problems, knowing whom to treat is problematic. Potential PTSD victims do not exhibit symptoms at the time of the traumatic event. Would accident witnesses demand prescriptions and thus imperil their future testimony? Some ethicists have even gone so far as to maintain that "bearing traumatic memories is the moral obligation of those who witness atrocities" (Miller, 2004). For example, even if individual Holocaust survivors were to benefit from treatment that weakened the memories of their experiences, society as a whole might be badly served by having no witnesses with unadulterated memories. Our memory is not merely our own; it's part of the society we live in. Somehow, we must preserve the historical record of atrocities without denying individuals the benefits of therapeutic drugs. In the last analysis, it's up to society to determine how far we want to take the technology.

A Pill to Remember

A major research effort is also being directed to the development of memory-enhancing drugs. The effort is primarily aimed at finding treatments for dementia, e.g., for Alzheimer's disease, but it includes developments that could enhance normal memory, particularly in middle and older age, when a degree of increased forgetfulness is normal (Farah, 2004). Memory-enhancing drugs such as Ritalin (methylphenidate) target the molecular mechanisms involved in memory consolidation (see above section for details). In specific terms, memory enhancers exploit the stress-driven adrenergic system that spontaneously becomes overactive in those suffering from anxiety disorders.

The Ethics of Memory Manipulation

Safety concerns, especially regarding the long-term use of neuroactive drugs by healthy individuals, are foremost, but certainly not the only ethical concerns expressed by laypeople and professionals alike (Farah, 2002; Farah & Wolpe, 2004). Enhancement or inhibition of the natural responses of very complex systems, which neuroscientists are only just beginning to understand, invites unforeseeable risks and consequences (Gabrieli, 2004). Nevertheless, scientists who work with patients who suffer from, say, intractable post-traumatic stress disorder see therapeutic forgetting differently. Such scientists go against the current trend in memory research, which is to find a drug or a gene to enhance memory. At any rate, since memory is woven into our individuality, changing the emotional content of memories does effectively dissociate our personal history from our recollections of that history. For example, we gain maturity, social responsibility, and empathy for others from distress, anxiety, and sorrow, as well as from happiness, joy, and contentment. The difficult question is to distinguish what is dysfunctional for an individual from what is dysfunctional for society. Evidently, the technology could be abused. For example, in medicating in order to desensitize combatants or terrorists to commit repugnant acts that, if constrained by guilt, they would never think of doing. On the other hand, when society demands soldiers to participate in warfare, the society also carries the responsibility to help that soldier get through the aftermath of involvement in that horror.

Ethics—Our Evolutionary Heritage

The neurobiological foundations of emotion are attracting mounting interest within the neurosciences due to advances in functional neuroimaging technology. With functional magnetic resonance imaging (fMRI), it is possible to identify patterns of neural activity associated with storing and retrieving sequences of complex events, attitudes, and emotions (Wood *et al,* 2005). Emotion plays a pivotal role in ethical experience by assigning value to events, objects, and actions. Ethical choice depends on our capacity to foresee the results of actions, and includes the acceptance of individual responsibility. Some of the most fundamental questions about our unique evolutionary origins and social relations are centred on issues of altruism and unselfishness (Fehr & Fischbacher, 2003; Fehr & Renninger, 2005). Most academics agree that ethical codes have arisen through the interplay of biology and culture. The human brain—the cortex in particular—is more than an instrument for shaping the environment. In addition to receiving and linking heard, seen, smelled, and felt sensations, there are parts of the cortex's frontal lobe that interpret what is received, and incorporates it into the development of judgment, volition, and consciousness of self and others. From these abstract qualities, it is believed, evolved altruism or seemingly unselfish

behavioural characteristics; that is, the willingness to choose cooperative over alternative behavioural options (Pollard, 2003). This opened opportunities for the development of a collective awareness, or ethics, which subsequently gave way to an ethical order of fitness-enhancing behavioural preference, to be used to one's advantage in personal and social relationships (Pollard, 2002).

Converging lines of evidence from evolutionary biology, neuroscience, and experimental psychology have demonstrated that ethics is, indeed, hardwired into our brains—effectively blending modern empirical testing with ancient wisdom. As a consequence, a fresh concordance between secular-based science and spiritual practice has provided new possibilities for the advancement of mental and social well-being (Pollard, 2004). For instance, with the aid of fMRI, Jorge Moll and his colleagues (Moll *et al,* 2002; Moll *et al,* 2003) have shown that subjects viewing scenes suggestive of ethical emotions strongly activated a common network of brain areas that included the prefrontal cortex and temporal regions, the thalamus, hippocampus, amygdale, and hypothalamus. Significantly, when responding to stimuli that evoke ethical or moral emotions, brain activation is consistently more powerful compared with the processing of neutral or unpleasant stimuli (Moll *et al,* 2003).The prefrontal cortex and temporal regions of the brain are critical for higher intellectual functions, social behaviour, perception, and ethical appraisal; the thalamus, hippocampus, amygdale, and hypothalamus are critical working centres of the emotional, or limbic, brain. Together, the intellectual prefrontal cortex and the limbic emotional brain allow us to mingle thoughts and feelings, cognition and emotion, providing an adaptive mix of intellectual and emotional brain power (Pollard, 2004).

Disciplined curiosity is natural and appropriate to the human mind—the sheer desire to learn and the satisfaction of gaining knowledge is Nature's special gift to *Homo sapiens*. It follows that harnessing knowledge to beneficial use in technology and practical skill is a responsibility that arises from the social and benevolent nature of humankind. But since technology is developing at an ever-increasing rate, ethics has to fundamentally change to keep up with this technological expansion. In the next few decades, we will have unprecedented opportunities to improve health and well-being, but also have increasing power to annihilate ourselves and our fellow inhabitants of Earth. Experts have estimated the risk that humankind will be wiped out by some technological disaster—nanotechnology, biological warfare, nuclear technology—at 20-50% in the next century (Savulescu & Foddy, 2005). But such a disaster is already possible with existing technology, so we have to become more resourceful by applying our collective energies from the combined pool of intelligence and sense of adaptive responsibility. In this context, I refer to an elevated awareness conveniently referred to as the emotional intelligence quotient, or EQ. A well developed EQ signals intellectual maturity—one is more responsive to physical and social environments. In closing, I would like to quote from a recent paper by Julian Savulescu and Bennett Foddy (2005):

> There is an urgent need to begin considering how we will face these new challenges to our nature and to our existence. Because technology begets further technological development, there is no halting or avoiding these problems. We must consider radically changing our practical ethics effort away from comparatively less important problems like privacy and reproductive cloning (which will never threaten our nature or existence) to these so critical and so far ignored challenges to humanity in the 21st century.

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Science, Technology, and the Supernatural in Contemporary Thai Novels*

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While science and technology rapidly progress, many people—especially those outside scientific fields—are increasingly nervous with the advanced materialism those two sciences create. Are science and technology able to control everything completely? Will science and technology truly bring luxurious life to humans? And, are there any risks in the seemingly smart, smooth paths led by science and technology? This paper explores how novels can discuss ethical issues of science and technology.

From a literary perspective, contemporary Thai novels reflect both admiration and concerns on these two significant branches of present-day science. Twenty Thai novels, whose main contents concern science, technology, and the supernatural, published from 1987–2003 A.D., have been studied for a research project entitled *Science, Technology and the Supernatural in Contemporary Thai Novels*. The purposes of this study aim to investigate ideas about three areas in Thai society that are seemingly not dominated by science.

Three questions to be answers in this paper include: What are the real causes behind obstructed scientific thought promotion in Thai society? Can Thai people neglect ideas about the supernatural and accept scientific rules? And, does the supernatural have any special function for Thai people, such that it is permanent in Thai society?

Reflections of Science, Technology and the Supernatural in Contemporary Thai Novels

Via close reading and detailed analysis, it was found that all novels in the study promote scientific thoughts/thinking. Many authors emphasized that educated people, namely university graduates, should not believe in any sort of supernatural power. They implied that such superstitions are irrational and old fashioned. But some of the novels presented the plot of confrontation between a faithfully rational protagonist and supernatural phenomena. It is clear that many authors indulge in the concept of the supernatural, despite the stock they put in scientific thinking.

This same contradiction is often found in Thai culture, and may be explained by two dominant aspects of Thai society. Let us first consider a cultural perspective: Most Thais live among their extended families, especially in rural areas. Family members are closely related, and elders are highly respected. Cultural customs and religion are directly transmitted from older to younger generations. Beliefs and practices about the supernatural have long been rooted in Thai local cultures, particularly in remote areas and among uneducated people. Family socialization is much more influential on these people than formal education is. So, many kinds of supernatural beliefs and practices are inevitable to rural people for whom traditions and customs still play important roles.

Another dominant factor in Thai thought is Buddhism, which is the major religion of Thai people. The following explanation by Phya Anuman Rajadhon (1958), a highly esteemed Thai scholar, provides a good background in Thai-style Buddhism.

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> Animism, with ancestor worship, is the primitive belief of the Thai . . . this formed the first layer of Thai religion. Later on came Buddhism and the Thai adopted it as their national religion. . . . the Thai inherited a fair proportion of Hinduism through the influence of the Cambodians . . . Whatever cults and beliefs are adopted by the Thai, they are readily modified to suit their temperament and surroundings. When they adopted Buddhism, they modified their basic belief of animism into the fold of Buddhism. Likewise [sic] when they embraced Hinduism, they adapted it as a subordinate to the former. As Buddhism and Hinduism were evolved from one and the same source, i.e., Brahminism, there was no hindrance to their assimilation. They became in time intermixed completely, and of course tinged with the former animistic belief.

The long modification of Thai Buddhism means Thais can interpret it in multiple ways. Instead of scientific teachings being held and practiced, Thai people might favour and expect miracles of Buddhism. This phenomenon is clearly reflected in many of the studied novels.

Science and Technology, the Formally Accepted Ideas of Sophisticated Thais

Most of the studied novels presented stories of sophisticated people in an urban environment. Nearly all protagonists were highly educated. Most were Ph.D. graduates or at least held a degree, particularly in the field of science. Seventy percent of the protagonists, representing the modern sciences, had and promoted scientific ideas. Thirty-five percent of the antagonists performed roles opposing science and technology, which might cause disasters. Eleven novels (55%) presented the antagonists as agents or performers of negative supernatural forces (black magic). Only five stories (25%) demonstrated that the protagonists accepted the existence and usefulness of both scientific and technological ideas *and* supernatural forces.

From the above figures, one may conclude that contemporary Thai authors support the current trend that science and technology are agreeable and beneficial in today's society. However, some (25%) of the studied novels exhibit concerns about risks that science and technology might bring along with progress. A remark that should not be overlooked here is that, according to these authors, science and technology are formally accepted ideas among only sophisticated Thais in metropolitan areas. Thus, an interesting question to examine is that whether scientific thought is subject to environment: Can it not flourish in remote areas among people with medium to low levels of education?

A few of the studied novels reflected views dealing with education in Thai society. One novelist (Nuntana, 1987) wrote about a country dweller with a low level of education. When presented with alien technology, he preferred his simple, familiar life to the conveniences of modern technology. Two other authors (Krukrit, 1988; Weerawat, 1994) underscored that sometimes even educated people did not apply scientific knowledge to their daily lives, but indulged in practices such as consulting fortune-tellers when encountering problems, or not arguing for facts or reason when they were in the minority.

In actual Thai society, many factors dissuade Thai people from science. Not only do material factors obstruct the promotion of scientific and technological concepts in Thai society, but local cultures largely prevent scientific mindsets in those rural communities. These are not dead-ended issues, but a multi-faceted approach must be taken to promote science in such cases.

Roles and Functions of the Supernatural in Thai Society

In most of the studied novels, the most criticized aspect of the supernatural is sorcery, which is the use of magic with the intent of harming another person. From an anthropological perspective, magic may actually be used to benefit the community or an individual (Nanda, 1994). Yet, many studied novels implied that the black magic of sorcerers was bad, and any decent individual should not be engaged in that practice. Another different reflection that appeared in some novels was the author's belief that the world is mechanical. All systems are planned and orderly processed. No one can break the rules, such as via immortality or controlling supernatural power, at his or her wishes.

These are the ideas of urban, educated authors. In the actual lives of rural Thais, as was roughly portrayed in a few novels, supernatural practices are a local medium for problem-solving, and can be easily acquired at little cost. On the contrary, modern science or technology is alien, specialised, difficult to acquire, and expensive. One studied novel, *The Double Worlds* (Tomayanty, 1991), portrayed a scenario in which each world and time had their own proper knowledge and technology, and civilization could not be measured by alien standards. This strong view implies that the usefulness or value of any knowledge is up to its context of time and place.

Although the majority of contemporary Thai novelists negatively portray the supernatural, some empirical functions of it in Thai society—especially in rural areas—are also portrayed.

Expectations of Thai Novelists Toward Science, Technology, and the Supernatural

Although most contemporary Thai authors clearly promote scientific and technological thought in their novels, that view might not be clear to readers. On the contrary, their stories sometimes demonstrated lots of facts and figures about science and technology, but did not encourage the significance of science and technology to the present world. For Thai people, science and technology still seem like imported knowledge. When reliable references were needed in a story, they were always from abroad. Thais seem to label both general principles and advanced trends of science as western. This is a point to which policy-makers should pay attention.

Although the authors blamed the supernatural for being irrational and unreliable, they often portrayed the power of Buddhist rites or words as preventing or even destroying black magic, thereby allotting a seemingly supernatural power to Buddhism. Thai authors seem to favour faithfulness in Buddhist teachings and miracles to scientific and technological ideas. This is another feature that contributes to the obstructed promotion of science and technology in Thai society.

It seems careless that some novelists even present the notion that in the near future, the supernatural will play as important a role as science and technology. The idea is likely based on Animism, not science. The source of this imagination was perhaps spread from some Hollywood films and a lot of English fantasy fiction. Thai people in general, as well as many novelists, welcome the view with no apparent suspicion. From an epistemic cultural perspective, it is observed that the creation of Thai local knowledge is far different from that of Westerners. Most of Thai knowledge is gained from observation of nature and mainly aims for harmonious, peaceful living. Thai culture does not want to control or defeat nature, like scientific endeavours appear to.

The studied novels clearly reflect that Buddhism is a major source of knowledge and practice in Thai society. It is widely proved and accepted that Buddhism is a scientific religion. Its major teachings and practices are empirical and rational. Unfortunately, most Thais understand Buddhism according to its outer layer of rites, with the hope of miracles. Many studied novels demonstrated the magic-like consequences of Buddhist amulets or scared materials, rather than the real meaning of the religion. Two of the novels, *The Oracle* (Phutasaun, 1991) and *Illusions* (Thomayanty, 1995), heavily explained Buddhist teachings in order to prove its scientific characteristics. Still, many parts of those stories tended to be supernatural.

One may conclude that contemporary Thai novelists do not have vivid awareness of how scientific thinking/knowledge is significant to their particular lives. The studied novels in this paper, although based on small-scale data, reflect meaningful views for consideration by whoever wishes to promote scientific thoughts and technological knowledge in Thai society.

Some Solutions

Corresponding to the stated questions of this paper and the sequentially described details, as the researcher of this project, I would like to propose these conclusions as some primary answers:

It is clear that local cultures are more influential on Thai living than modern science is, and that the Thai people consider science as professional knowledge rather than as practical concepts for solving problems in daily life. This directly indicates that the education processes of science in Thai society are inefficient and have missed their goals. Thai people, both in urban and especially in rural areas, are not effectively trained to form scientific minds and to apply scientific thoughts to their lives. Buddhism is a major influence on Thai people, but in their culture, the scientific characteristics of Buddhist teachings are not well taught. Instead, outer layers of the religion are widely spread, such as miracles and scary materials.

The two basic stated problems may be solved by the same procedure: effective education. As most of the studied novels reflect, educated Thais are the most likely to understand the benefits of science and technology to the modern world. They clearly understand that beliefs in the supernatural are antiquated, and are fully aware that it is only useful for mental consolation. To promote scientific thoughts or technological knowledge to Thai people, we need not decline local cultures or Buddhism. Instead, it would be a very effective procedure if policymakers could design methods of promoting science that use both of those dominant factors.

Anthropologists all over the world have proven that the roles and functions of religion and supernatural beliefs are widely important and beneficial to members of different cultures. While science and technology are modern competitors, they can never be substitutions. These varying roles are, for now and in the far future, the beauty of what makes up cultures.

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A Conception of Risk in Decision-Making*

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Because a risk-free society is impossible, issues about acceptable risk are widely debated in decision-making discussions. One of the main queries in their controversies is who should define risk (Shrader-Frechette, 1996). In their book, *Understanding Risk: Informing Decisions in a Democratic Society* (1996), the Committee on Risk Characterization of the U.S. National Research Council proposes that risk characterization should not be conceived as a summary or translation of the results of technological analysis. Instead, it should be reconceived as an output of an iterative, analytic-deliberative process that is organized by the following seven principles:

(1) Risk characterization should be a *decision-driven activity*, directed toward informing choices and solving problems.

(2) Coping in a risk situation requires a *broad understanding* of the relevant losses, harms, or consequences to the interested and affected parties.

(3) Risk characterization is the outcome of an *analytic-deliberative process*. Its success critically depends on systematic analysis that is appropriate to the problem, responds to the needs of the interested and affected parties, and treats uncertainties of importance to the decision problem in a comprehensive way. Success also depends on deliberations that formulate the decision problem, guide analysis to improve the decision participants' understanding, seek the meaning of analytic findings and uncertainties, and improve the ability of interested and affected parties to participate effectively in the risk decision process. The analytic-deliberative process must have an appropriately diverse participation or representation of the spectrum of interested and affected parties, of decision-makers, and of specialists in risk analysis, at each step.

(4) Those responsible for a risk characterization should begin by developing a provisional *diagnosis of the decision situation* so that they can better match the analytic-deliberative process leading to the characterization to the needs of the decision, particularly in terms of the level and intensity of effort and representation of parties.

(5) the analytic-deliberative process leading to a risk characterization should include early and explicit attention to *problem formulation*; representation of the spectrum of interested and affected parties at this early stage is imperative;

(6) The analytic-deliberative process should be *mutual and recursive*. Analysis and deliberation are complementary, and must be integrated throughout the process leading to risk characterization: deliberation frames analysis, analysis informs deliberation, and the process benefits from feedback between the two.

(7) Each organization responsible for making risk decisions should work to *build organizational capability* to conform to the principles of sound risk characterization. At a minimum, it should pay attention to organizational changes and staff training efforts that might be required, to ways of improving practice by learning from experience, and to both costs and benefits in terms of the organization's mission and budget.

According to the idea of the Committee, in the iterative, analytic-deliberative process, there are three groups of people who make the input and output: public officials or other designated decision makers;

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analytic experts, such as natural and social scientists; and the interested and affected parties to the decision. "They interact within each of the tasks leading up to risk characterization: deliberation frames analysis, and analysis informs deliberation" (p.30). The analytic process "includes various ways of reasoning and drawing conclusions by systematically applying theories and methods from natural science, social science, engineering, decision science, logic, mathematics, and law" (p.30). The deliberative process "includes the methods by which people build understanding or reach consensus through discussion, reflection, persuasion, and other forms of communication" (p.30). Both of the processes "allow for interaction across different groups of experts and between experts and others" (p.30).

There are two good points of the proposed idea of the committee. The first is the participation of the interested and affected parties, which moves decision-making to the public arena. Risk is often conceived as a prospect of physical harm and disregarded its dimension of human minds and societies (Hollander, 1994). The second is the dynamic of the definition of risk. The scientific and social knowledge is relatively uncertain. The affected parties should have an informed choice, regardless of what they choose.

The point I wonder is whether the society has the resources and mechanisms for dealing with these conditions, especially in the case of developing countries where the scientific knowledge comes from outside. How could the people in these countries have an informed choice? Could they choose a way of life without science?

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National Bioethics Commission of Indonesia in the Framework of National Scientific Research and Technological Development*

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Basic Consideration

The Joint Decision by the Minister for Research and Technology, Minister of Health, and Minister of Agriculture of Indonesia on the establishment of the National Bioethics Commission (NBC) on 17 September 2004 was a specific decision. This relates to the institutionalization of a forum for moving forward discussion and consideration of issues and problems related to bioethics at the national level. It has long been recognized that this channeling was a pressing problem in Indonesia. Ideally it is expected to become the focus and forum to discuss and consider issues of national interest for building and accumulating common understanding of the rapid progress in science and technology with respect to a wider international environment.

The NBC was established to accomplish the mission in identifying and elaborating specific issues by considering and allowing for a multi-disciplinary approach of problems. This will come from a wide spectrum from the basic to the applied sciences, especially the life sciences, as being applied and implemented in the fields of medicine and health, agriculture, and science and technology in general.[27]

Consider the following general formulation:

*"**Ethics** can be described as a sub-branch of applied philosophy that seeks 'what are the right and the wrong, the good and the bad set of behaviours in a given circumstance'. **Bioethics**, on the other hand, is a quasi-social science that offers solutions to the moral conflicts that arise in medical and biological science practice."*[28]

According to this formulation, bioethics covers issues and problems with a wide impact in the community, which originate from the rapid progress and development of scientific research and technological development, especially life sciences.

A set of initial bioethics norms as a basis for further analysis is (1) *'respect to autonomy'*, (2) *'non-maleficence'*, (3) *'beneficence'* and (4) *'justice'*.[29]

Hence, bioethics covers the ethical, legal, social, and cultural dimensions of these life sciences and their related technologies. It is commonly interpreted to have umbrella coverage in guaranteeing respect for human dignity, human rights, and other basic freedoms.

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27 It was covered in a UNESCO forum and documented in the Proceedings of the Round Table of Ministers of Science, *Bioethics: international implications,* Paris 22-23 October 2001.

28 From *"The 'Four Principles Of Bioethics' As Found In 13th Century Muslim Scholar Mawlana's Teachings"* by Sahin Aksoy, Faculty of Medicine, Department Medical Ethics and History of Medicine, Harran University, 63300 Sanliurfa, Turkey and Ali Tenik, Faculty of Theology, Department of History of Sufism, Harran University, 63300 Sanliurfa, Turkey, in BMC Medical Ethics 2002, 3.

29 These four norms were introduced as 'Four Principles' by the philosophers Beauchamp and in their book *Principles of Biomedical Ethics*, Oxford University Press, New York, fourth edition, as quoted by Sahin Aksoy and Ali Tenik in the reference quoted above..

Bioethics: Institutionalization

During 2003 various bioethics issues were discussed in Indonesia in relatively limited forums. The Department of Foreign Affairs took the initiative and hosted a seminar-cum-workshop on human cloning because the issue was already being introduced to the UN General Assembly. However, the discussion, analysis, and arguments were far from sufficient to gain proper perspective, understanding and implication of human cloning. No open debates and further forum for nationwide analysis were held to follow-up on the general consensus reached.

Bioethics is a difficult and complex topic. Bioethics in particular deals and is closely related to morality in research, development and implementation of genetic engineering products, whereas in food products we deal with the issue of *safety*. These products may well be safe in relation to the environment and for consumption, but may ignore bioethics norms in their processing.

In the midst of the great interest of the international world to the performance of the Universal Declaration on the Human Genome and Human Rights, in a state-of-the-art report to the UNESCO's 32nd General Conference, Indonesia reported that :

"In the early 1990s … the science community found its way to reach beyond the 'code-of-ethics approach' leading to a more open debate of identifying and finding the future path and orientation of the new technologies, such as those related to stem-cell technology and human cloning. It is still in a state of confusion as no real communication among the actors exists; as yet the communication channels between scientists, ulemas, public at large, and Government are not functioning effectively" (UNESCO, 2003).

In other international forums, Indonesian science is to take a more active role, especially within the UN system, through the International Bioethics Committee (IBC) and the Intergovernmental Bioethics Committee (IGBC) of UNESCO. Since 2005, Indonesia has been a member of the Intergovernmental Bioethics Committee, which comprises 36 countries. In the meantime the Round Table of Ministers of Science on "Bioethics: International Implications" in Paris, 22-23 October 2001, requested UNESCO:

"… to examine the possibility of developing, starting from the Universal Declaration on the Human Genome and Human Rights, a universal instrument on bioethics, in association with national ethics committees and similar bodies, … and in consultation with the public and private sectors, the scientific community and representatives of civil society …" (UNESCO, 2001).

The Situation in Indonesia

Attention to bioethics dates from the early 1970s, with cases of *in-vitro fertilization* IVF, organ transplantation, and xenotransplantation, in particular. With the discoveries in molecular biology and progress in biotechnology, the way was laid open for manipulation and genetic engineering. While initial attention to bioethics technolgy was applied to individual persons, modern biotechnology brings with it a mucher wider societal impact, as we are dealing with life from its basic and fundamental forms.

The progress in S&T also allows scientists to produce what are called genetically-modified organisms (GMOs). Food products and plantation plants are two recent products that were introduced to the fields by the "economic path." Regulations stipulate that before being "used," domestic as well as imported, agricultural genetically engineered products should fullfil all requirements of biosafety, considerations related to religion, socio-culture, ethics and esthetics. While what we are facing are multidimensional problems, these may be grouped and structured so that a systematic approach in their analysis could be attempted according to the needs and priorities.

Biotechnoloy is believed to be a new economic wave with the support of information technology. The dependence of biotechnology on natural resources put Indonesia at a comparative advantage for national development. Besides its great potential, the implementation of biotechnology also invites moral and social impacts.

Mission of NBC

In Indonesia, bioethics norms should be "translatable" into workable actions, that obtain general public acceptance, since modern life presents options, choices, and values that are in need of constant evaluation and reinterpretation. It is a matter for the general public to understand and perceive these with the right frame of mind. A consensus can be build from mutual trust by the parties involved.

Specifically, the NBC comprises not more than 35 members who are experts and professionals in various scientists, lawyers, sociologists, philosophers, and theologians, with the understated objectives:

- *to review* ethics pertaining to the direction of the development of sciences, especially life sciences;
- *to advise* the Government on the feasibility of policy and regulation of bioindustries, research organizations, scientific professional organizations, and individuals doing research on and/or related to life, in agricultural biotechnologies, industries and health services and evaluate the moral base of bioethical norms; and
- *to disseminate* information about bioethics and life sciences, which rely on ethical review and analysis.

The recommendations and considerations by NBC are prepared and submitted to the Government as inputs to guide and push scientific research and technological development. Other study results are provided and presented to the public at large, indirectly through publications, and directly through periodically held "road shows."

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Codes of Ethics for Engineers and Scientists in New Zealand*

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The world today seems like a dangerous place to many who are following the daily news. Fears centre around a number of developments: the possibility of a pandemic; the spread of HIV/AIDS; global warming; misuse of nuclear power; the downstream effect of genetic modification of crops, particularly "terminator seeds"; depletion of fishing stocks in the oceans; "peak oil"…

Whether or not these fears are realistic, they share one factor—they all may involve human agency, and many of them are tied in with the development of technology. Engineers and scientists have realized that there is a growing disquiet about what "they are up to", and a number of professional organizations have decided that one way to improve public confidence is to adopt a Codes of Ethics or Codes of Practice.[30] In this gathering, it is hardly necessary to mention the work UNESCO has done regarding the *Advisability of Elaborating an International Declaration as a Basis for an Ethical Code of Conduct for Scientists*.[31] But it is relevant to recall that in 2004, the Division of Ethics of Science and Technology examined, among other materials, 115 existing ethical standards for science, including 39 international standards and 76 national standards, representing 23 countries on six continents.

I have been asked to focus on just a small fraction of this material: Codes of Ethics for engineers and scientists in New Zealand. For a lawyer like me, being asked to do a presentation on such Codes of Ethics presented something of a challenge. The challenge was all the greater because I had in mind Para. 2.3 of the conclusion of the Director General's report (33 C item 5.28), which recognises "that ethics and responsibility of science should be an integral part of the education and training of all scientists." I thought it important to look not only at the Codes, but also to try and find out if they figured in the teaching and training courses of the relevant disciplines. Unfortunately, in the time available, I was unable to establish how widely Codes of Ethics were part of the materials used in ethics courses for science and engineering students. However, I did find that increasing effort is put into teaching ethics somewhere during professional training, usually either in the fourth year or in a block course (Buckeridge, 2001).

During my years as Chair of the Health Research Council of New Zealand's Ethics committee, we were concerned with the very specific issue of research involving human subjects. I will explain later in the paper what the New Zealand practice in that context demands. But the emphasis is certainly different from the context of any Professional Codes that operate in New Zealand for Engineers and Scientists. So I called in the aid of some friends and former colleagues to help flesh out the information I was able to access through the normal channels, including the internet, particularly in relation to teaching. To those mentioned in the endnotes to this paper. I express my gratitude for their willingly given help.[32]

* Paper first presented at the Consultation Meeting on Ethical Codes in Science and Technology, UNESCO Bangkok, May 2006.

30 See paragraphs 1-3 of the preamble of the Code of Ethics of the Royal Society of New Zealand.

31 UNESCO IBC, 2003. *Advisability of Elaborating an International Declaration as a Basis for an Ethical Code of Conduct for Scientists*. Paris, UNESCO.

32 My thanks for assistance with information for this paper: Mr Richman Wee; Dr John St. J. S. Buckeridge; Members of the Engineering, Science, and Philosophy Departments of Auckland University of Technology and of the University of Auckland; Practice Manager and staff at IPENZ.

I intend to concentrate only on two specific New Zealand Codes: [33]

(1) The Royal Society of New Zealand Code of Professional Standards and Ethics, adopted as a revised code in 2003, which you may say is our gold standard,[34] and;

(2) The IPENZ Code of Ethics of the Institute of Professional Engineers of NZ, which was approved by the Board to take effect from 1 January 2005, replacing the previous Code.[35]

There are a number of other Codes, a sample of which I will simply list with a brief comment. I will come back to the overall position in New Zealand in respect to research that involves either human subjects or animals, because those are overarching requirements covering all researchers.

Examples of Other Codes:

(3) Codes of Ethical Conduct under the Animal Welfare Act 1999:[36]

all institutions (universities, institutes, or companies) undertaking animal-based science must have a Code of Ethical Conduct and an Animal Ethics Committee. These are further commented on below;

(4) The Ethics Code of the New Zealand Institute of Agricultural and Horticultural Science;[37]

(5) The NZIMLS Code of Ethics (New Zealand Institute of Medical Laboratory Science) is a short, mandatory Code for those registered to practice as Medical Laboratory Scientists or Technicians in New Zealand;[38]

(6) The NZIFST Code of the New Zealand Institute of Food Science and Technology is interesting for the very specific way it deals with conflicting loyalties [39]. The second paragraph of the introduction reads:

> Professional food scientists and technologists may be faced with conflicting loyalties, e.g. [sic] to society and to their employers. The Code of Ethics establishes the underlying principle that in matters of health, safety, fraud and deception, a Member's primary obligation is to society. [It then provides examples.]

In s. 3.1, special provision is made to assist in these situations:

> This code recognises that Members, either through their own volition, or by direction of their employer, are sometimes faced with a decision or action which may breach this code. As a support network, the Institute shall maintain a group of Ethics Advocates with the following roles:
>
> To be available to individual members so that they can, in confidence, seek advice on personal ethical dilemmas and issues;
>
> To represent individual members on ethical issues, e.g. to their employer, if so requested;
>
> To ensure that young members, in particular, receive training and assistance in the area of ethics.

This issue is further elaborated in s 4.1 and 4.2.

33 The following Codes are not included in the paper:
The Association of Social Science Researchers (ASSR) Code of Ethics http://assr.rsnz.org?ETHICSPG.,htm
SPEAR- Social Policy Evaluation and Research. http://www.spear.govt.nz/SPEAR/tools/wikipage.do?wikipage=Ethics
Sociological Association of Aotearoa (New Zealand) CODE OF ETHICS http://saanz.science.org.nz/ethics.html
The Australasian Evaluation Society Code of Ethics. http:/www.aes.asn.au/about/code_of_Ethics_2002.html
Engineers for Social responsibility Inc. code of ethics. http://www.esr.org.nz/about/about.html
The NZ Psychological Association Code of Ethics. http://www.psychology.org.nz?about/Code_of_Ethics_2002.html

34 http://www.rsnz.org/directory/code_ethics.php

35 http://www.ipenz.org.nz/ipenz/who_we_are/ethics_inc.cfm

36 http://anzccart.rsnz.govt.nz/text/control.html see p. 8, B.

37 http://www.agscience.org.nz/NZIAHSconstitution.pdf

38 http://www.nzimls.org.nz/116.html

39 http://www.nzifst.org.nz/about-NZIFST/ethics.asp

I am leaving aside all the codes dealing with health sector professionals. It should be noted, however, that apart from the specific codes of the health professions, the health sector is also subject to a number of statutes: the New Zealand Public Health and Disability Act of 2000; the Code of Health and Disability Consumers' Rights of 1996; the Privacy Act of 1993; the Health Information Privacy Code of 1994; the Injury Prevention, Rehabilitation and Compensation Act of 2001 and the Health Research Council Act of 1990. Some of these also cover research done by non-medical scientists. I am also leaving aside codes for social scientists and sports scientists.

The Royal Society of New Zealand Code

The Royal Society of New Zealand Code starts with an important preamble that points out, among other things, that the trust of the general public can be, and has been, eroded partly by the general public's difficulty in understanding science and their resulting feeling of vulnerability. It particularly mentions nuclear fission and genetic research. It says:

> "they are equally aware that they are in the hands of scientists and of commercial enterprises and they are disinclined to fully trust either group to always act in the overall interests of humanity. . . . If, therefore, natural and physical scientists, medical scientists and technologists, technicians and all involved in research or its application are to continue to have the freedom to operate, and to have the public support that that freedom requires, it is imperative that they, whatever their field of expertise and whether in the private or public sector, are seen to act professionally by following a formalised code of practice" (Royal Society, 2003).

The Code then gives the statutory basis for the Code—which is Section 34 of the Royal Society of New Zealand Act of 1997—that makes it mandatory to issue a code, and also to make the Code and any amendments to it *publicly available*.

Here, then, are two important criteria: (1) statutory underpinning; and (2) public availability.

The third important factor is the coverage: this code is *mandatory* for all members of the Royal Society, who can be called to account for any breach; but it is also a *voluntary* code for all other scientists and technologists in New Zealand. So the third important factor is: (3) accountability (or enforceability).

The Code covers members whether or not they are "self-employed on the staff of private or public companies or of Government or private institutions, or whether they be natural or physical scientists, social scientists, medical scientists or practitioners, technologists, technicians or others."[40] Further, all investigations must be undertaken in accordance with "accepted professional standards and codes of ethics, both those prescribed by parliamentary legislation and those promulgated by professional bodies."[41]

Because the Code is lengthy and detailed I will only pick out a few points from it here. So, for example, after sections 6-8, which detail duties to human research subjects, duties to funders and purchasers of research, and to protect the welfare of animals,[42] in Section 9 there is a detailed duty to sustain and protect the environment, including that "they must draw the attention of both decision-makers and those to be affected to any environmental impacts of the proposed work and to the perceived immediate and potential consequences which may follow." In section 10, on educational and communications settings, there are a number of interesting duties, e.g., (in b.) to provide "up-to date instruction and guidance . . . including . . . reference . . . to areas of controversy"; (in f) "to provide balanced and open-minded presentation of issues where controversy and differences of opinion exist so that alternative views are aired and explained"; and (in h) "taking care to also objectively state the known risks, as well as the benefits and advantages, in any new development."[43]

40 Royal Society of New Zealand Revised Code of Professional Standards and Ethics (12 June 2003) Online at http://www.rsnz.org/directory/code_ethics.php.
41 Royal Society of New Zealand Revised Code of Professional Standards and Ethics, Preamble xxx.
42 Refer to the section on animals.
43 Royal Society of New Zealand Revised Code of Professional Standards and Ethic, section 34 xxx.

In Section 11, two present-day issues are singled out for special treatment: (a) the use and storage of genetic information, and (b) operations involving genetic modification.

The last part of the Code deals with complaints, hearing procedures, and sanctions.

The Institute of Professional Engineers of New Zealand (IPENZ) Code

Whereas the Royal Society Code is both very wide in application and is very detailed, the IPENZ Code (the second code for discussion) is specifically geared to the engineering profession. It opens with a statement that commitments to ethical values "are additional to the obligations, which every member of society is required to observe, such as obeying the law, and reflect the additional responsibility expected of all professionals. It therefore follows that the Institution must maintain an appropriate Code of Ethics, to publish it for the information of the public and to enforce it impartially."

The Code consists of three parts:

(1) a set of five fundamental ethical values;

(2) expanded guidelines, ranging "from exhortations to excellence to prescriptive directions as to what constitutes ethical professional behaviour"; and

(3) minimum standards against which members will be judged in terms of whether they have complied with Rule 4 of the Institution to behave ethically.

The code has the force of Regulations as set out in Rule 22, and all members must comply with the provisions of the Code of Ethics.

In terms of the criteria I set out under the Royal Society Code, the IPENZ Code has:

(1) regulatory (though not statutory) underpinning;

(2) public availability; and

(3) enforceability through the Rules of the Institute.

Regarding the specific "Values and Guidelines":

The first is "Protection of Life and Safeguarding People." When you consider that the collapse of a poorly designed or shoddily constructed building can kill many people, this is clearly an all-important value. In Part 2 of the Guidelines, this is expanded to include, i.e., assessing obligations to clients, employers, and colleagues; minimising risk of loss of life, injury, or suffering; and drawing the attention of those affected to the level and significance of risk associated with the work.

The second value is "Professionalism, Integrity, and Competence". There are 11 headings in the Guidelines, of which I will mention just 2.2: "Giving engineering decisions, recommendations or opinions that are honest, objective and factual. If these are ignored or rejected [sic] you should ensure that those affected are made aware of the possible consequences."[44]

The third value is "Commitment to Community Well-being", and includes 3.2: "endeavouring to identify, inform and consult parties affected, or likely to be affected, by your engineering activities" and 3.6: "as a citizen, using your engineering knowledge . . . to contribute . . . to public debates . . . except where constrained by contractual . . . obligations."[45]

The fourth value is "Sustainable Management and Care of the Environment", which includes 4.2: "endeavouring to minimise the generation of waste and encouraging environmentally sound reuse, recycling and disposal." As anyone who has observed large building operations will know, the waste associated with such projects is enormous, and recycling perfectly good building material is difficult because of the fine line between allowing re-use versus building-site theft. In practice, this would be a difficult injunction to follow.[46]

44 Institute of Professional Engineers of New Zealand (IPENZ) Code of Ethics, section 2.2.
45 Institute of Professional Engineers of New Zealand (IPENZ) Code of Ethics, section 3.2.
46 Institute of Professional Engineers of New Zealand (IPENZ) Code of Ethics, section 4.2.

The fifth value in the IPENZ Code is "Sustaining Engineering Knowledge," which includes sharing professional knowledge for the benefit of society.

In Part 3, "Minimum Standards of Acceptable Ethical Behaviour," the positive values and obligations of Parts 1 and 2 are spelled out and sometimes recast as prohibitions, breaches of which can be sanctioned. For example: not to misrepresent competence; not to promise, give, or accept inducements; and not to disclose confidential information (except when the health or safety of people is at risk). The matter of "inducements" can be very tricky for a New Zealand engineer who is bound by the IPENZ Code, but works in a country where the local customs are different.

The Overarching Structure of Legal and Other Requirements

Now that we have reviewed two of the Codes relating to the work of scientists and engineers in New Zealand, it is important to place them in the overall structure of legal and other requirements that also affect the ethics of their work.

Company Employees

Regarding scientists and engineers who work in the corporate world, the public sometimes assumes that they are completely dominated by the interests of their corporate masters. This is a particularly unfortunate perception for scientists involved with genetic work as well as those employed by pharmaceutical firms. It should be remembered, however, that in the area of company law and corporate governance, the move to have formal ethical standards is gaining force. Though this subject is outside the parameters of this short paper, reference should be made, for example, to the ASX Corporate Governance Council's *Principles of Good Corporate Governance and Best Practice Recommendations*,[47] produced in Australia in March 2003, which includes in the essential corporate governance principles: "A company should . . . Promote ethical and responsible decision-making."

In New Zealand, the Institute of Directors produced a Code of Proper Practice, and in *Corporate Governance in New Zealand Principles and Guidelines*, the Securities Commission includes a requirement that every entity should adopt a written code of ethics which would include a section on conflicts of interest and another on whistleblower procedures.

The ethical requirements set out in professional codes for scientists and engineers are, therefore, not necessarily negated by corporate employment obligations. In fact, if triple bottom line reporting should become the norm, the ethical responsibility of the scientist or engineer who is a company employee could be enhanced[48].

In New Zealand, two overarching legal regimes must also be considered when the ethical obligations of scientists are discussed. They are discussed in the two following sections:

47 www.asx.com.au/corporategovernance.htm

48 see also: Farrar, J. Corporate Governance: Theories, Principles and Practice. 2nd ed, 2005, p. 359, 449, 452, 453:

"According to Korn/Ferry International's report Boards of Directors in Australia and New Zealand 2000, 62 percent of Australian respondents and 43 percent of New Zealand respondents had a written code of ethics. In Australia 69 percent of the public listed companies, 50 percent of private companies, and 33 percent of government boards surveyed had them. In New Zealand, 55 percent of public listed companies had them, but only 25 percent of private companies did. By contrast, 54 percent of government boards had them."

Mention should also be made of the UN Economic and Social Council work on the Formulation of the UN Code of Conduct for Transnational Corporations E/C10/1985/5/2 , 22 May 1985, and the work of the OECD and World Bank.

The Requirement of Ethical Approval for any Research Involving Human Subjects

The current system for review of research involving human subjects was put in place in December 2004, after a long process of review and consultation. The details are complex and best accessed through two key documents: the Health Research Council of New Zealand *Guidelines on Ethics in Health Research*, and the Ministry of Health's *Operational Standard for Ethics Committees*.

In summary, the requirement to obtain ethical approval for any human subject research is based on a number of sources, set out in part 3, S.92 of the Operational Standard. In summary, they are: The Health and Disability Services Consumers' Rights; International conventions and statements; professional codes; requirements of funders, especially the Health Research Council; the Injury Prevention, Rehabilitation and Compensation Act 2001; and the Health Information Privacy Code 1994; the requirements of peer-reviewed journals. S.95 sets out all the different kinds of research investigations that must be submitted for review.

Ethical review is conducted by a number of ethics committees:

As set out in the Health Research Council's Guidelines, the statutory committees are:

- The Health Research Council Ethics Committee (HRCEC);
- The National Advisory Committee on Health and Disability Support Services Ethics;
- The Ethics Committee on Assisted Reproductive Technology (NEAC); and
- Six Regional Health and Disability Ethics Committees and the Multi-region Ethics Committees.

There are also institutional and private sector ethics committees set up by organizations and accredited by the HRCEC.

The HRC Guidelines set out more details than the Ministry of Health Operational Standard as to which research requires ethical approval. They also set guidelines for applications and special types of research: e.g., using body parts and tissues from deceased persons and from living persons; human gene therapy; *in vivo* human gene manipulation proposals; and other specific issues. The Guidelines set out recommended good practices for issues arising out of the Health Information Privacy Code, such as the use and disclosure of information. It provides coverage of the Ethics of Health Research and supplements some of the specific codes of the various professional groups that engage in research.

The Law Relating to Any Work with Animals

The Animal Welfare Act 1999 provides that all scientists, as individuals and through their institutions, are expected to accept ethical responsibility for their behaviour towards animals.

The legal structure by which this is monitored is:

- The Act sets up a National Animal Ethics Advisory Committee (NAEAC) with an independent Chairperson who must not be an animal-based scientist or have any direct connection with animal-based science, which oversees provisions set out below and advises the responsible Minister (of Agriculture).
- Each institution where animal work is done is legally required to have a Code of Ethical Conduct and an Animal Ethics Committee.
- The Code defines what the organization must do when it engages in animal-based science. The Code must be submitted to NAEAC, and if it considers it satisfactory, it is passed to the Director General of Agriculture and Forestry for approval. The Code must be reviewed after five years by an independent reviewer; it will only be renewed if the institution demonstrates that it has been working within its Code and that the Animal Ethics Committee has been working properly.
- Schools and companies that use animals for scientific purposes can approach large institutions like universities to make formal arrangements to submit their proposals to use animals in research, teaching, or testing to that institution's Animal Ethics Committee, and they must abide by its Code.

- Animal Ethics Committees, in addition to senior staff, must have three independent members: one from a recognised animal welfare organization, one nominated by the local authority, and a veterinarian nominated by the NZ Veterinary Association. They are given advice *interalia* by the Australian and New Zealand Council for the Care of Animals in Research and Teaching (ANZCCART). Colleagues of animal-based scientists also have a watch-dog role—The Animal Welfare Act 1999 has a mechanism for reporting abuses. It also provides for a compulsory 5-year review.
- Animal Ethics Committee must consider, and be satisfied before giving approval to all research, teaching, and testing procedures before they begin. It must: assess and minimise all harm to animals; review the expected benefits and assess them against the resulting harm to decide whether it is acceptable to do the work; and check the experience and training of the people involved, the standards of animal care, and responsibility for day-to-day care and emergency attention for the animals.

Finally, as a number of the codes also point out, many scientific publications require proof that the work submitted for publication has obtained all required ethics approvals.

Summary

To be effective, a code of ethics needs to have the credibility of some legal or at least influential sectoral backing. If there is statutory authority, the person bound by the code has much more support when it comes to needing to follow the ethical requirement in the face of employment or other conflicts of interest.

Making the code available to the public is absolutely crucial if it is to be effective, both in controlling the conduct of those bound by the code, and to instill a feeling of trust in the public. There must be some clear arrangement for complaints about breaches of the code, and for sanctions for such breaches if proven.

It is probably also helpful to have some arrangement, as in the NZIFST Code, for advocates or "buddies" to advise and, if requested, support the person who has to make an ethical stand vis-à-vis an employer or other influential person. This is particularly important for young or inexperienced professionals.

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Consulting the Public in the Setting of Bioethics: Regulatory Framework and Policy in Malaysia*

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Introduction

Bioethics encompasses values in science, life and society. Indeed, the principles of bioethics have been and will continue to be recognised by a broad range of religious, philosophic and ideological viewpoints. Despite some objections, it has developed a number of pragmatic principles for reducing some of the problems arising from different world views in pluralistic societies (Sass, 1990).

To draft a policy without consulting public opinion is a disaster. In regards to bioethics, communities' values systems must be the primary agenda. Since health policies are not an exclusive subject, the participation of people from diverse backgrounds and experiences in the decision-making process is significant in tandem with the principles of a pluralistic democracy. Structured paternalism lies coherently in the professionalism within the medical fraternity, yet it is not adequate to advocate the framework of social justice for being ignorant of the public opinion. While Malaysia is still working on the comprehensive regulatory framework, the existing bioethics policy must diligently consider a tacit guideline on how public opinion will effectively address bioethical issues according to proper procedures and findings. The standing committee set up for assisted reproductive techniques (ART) drawn up by the Malaysian Medical Association and Obstetrical and Gynaecological Society of Malaysia in 1999 deserves an appraisal, for example. A comprehensive set of administrative, ethical and clinical guidelines would provide safety and efficacy in its and other's scientific practices.

Indeed, the existing proportion of membership in the Committee should welcome more participation from public stakeholders. This participatory model, however, requires a higher level of scientific literacy among them before a dialogue session could be held. Public discourse and collaborative networks among the medical regulatory bodies and non-governmental organisations is another concern. Though Malaysia is still at the infancy stage particularly on the structure of bioethics committee and comprehensive legislation on bioethics, transparency in the decision-making process must be constant. Regulating law under the so-called 'public policy' irrespective of the public criticism is an irreconcilable paradox.

This paper attempts to critically analyse the efforts undertaken by the Malaysian Government in the setting of bioethics policy. Aside from that it researches how authorities deal with public response to particular bioethics issues. Various participation in the setting of bioethics policy in Malaysia enables greater understanding and acceptance of the public to the prevailing issues. International guidelines are the fundamentals to be incorporated, yet they must be situated within the local traditions, and societal, religious and cultural sensitivities.

Relationship Between Pluralistic Democracy And Bioethics

In its constitutional tradition, 'pluralistic democracy' means the ratification of the public opinion as one of the elementary form in a democratic government. Majority views are sought to support the proposition that any policy or regulation promulgated by the respective government reflect the needs of the society. However, to consult the public in drafting law does not necessarily mean giving unfettered

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favour to them. The premise here is very apparent – the notion of civil society is trivial and irrelevant if the discourse on bioethics policy could only be confined to a particular small circle of scientists and policy makers. In anticipation of its onslaught, society as a whole should be aware and prepared (Leng, 2000). Indeed, the mechanism of control in a legal system is not merely structural in form, but it encompasses values, attitudes and community responsiveness (Faruqi, 1995). To achieve this objective, there must be regular dialogues between two persons who are willing to exchange their thoughts and values inclusive of seeking public involvement in the decision-making process (Macer, 1999).

In doing so, public opinion requires due respect from the professionals. Aside from that, transparency will remain a pursuit unless the public has access to information. Of utmost importance, the membership structure of decision-making bodies must not be dominated by professionals considered to be experts only. Social scientists also can help law-makers to decide if a law will work, and if it would, how best to design such laws. It is crucial for social scientists to hold up a mirror so that one can see how our social conditions change over time, and, with them, our notions of what is morally permissible. In Western countries, the policy-makers have had time to grasp many of these issues. In Asian countries, their counterparts are only just now encountering similar issues (Iyer, 2004).

Bioethics in Malaysia

'Bioethics' by its own nature and definition has attained general consensus. However, one must give full account of the Malaysian context that is fundamentally distinct from other jurisdictions. The construction of bioethics goes beyond the limited function of a Ministry. The Ministry of Health, for instance, only caters issues relating to human beings. Even in its mission, the Ministry aims to provide equal access to healthcare to all people irrespective of race, gender, religions and background. The Ministry of Science, Technology and Innovation, on the other side, focuses on matters pertinent to the advancement within the stream of science and technology. There is the possibility, in the future for Malaysia to constitute its own National Bioethics Committee. Since aspects of bioethics are separately governed under the auspices of different Ministries, coordination amongst them must be first clarified to avoid redundancy. At present, the Government is endeavouring to improve the implementation of the existing policy. A numbers of disciplines have also been brought into the structure of the Committee. Inter-ministerial networks are encouraged to deliver quality in realising the plans of action.

The Government negotiates international guidelines as a theoretical underpinning of Malaysian bioethics debates because religion has a profound influence over life in the country. Therefore, due to differences in culture and in the degree of religious adherence, means the development of Western bioethics may not necessarily be reflected *in toto* here (Talib, 2002). The policy and guidelines that are currently in practise have no legal binding. However, a complete version of them could be the primary source of guidance to keep abreast of developments in some areas of bioethics in Malaysia. The current guidelines conform to international standards; however they do not outline a proper procedural mechanism or a clear implementation strategy. Some have also claimed that legislation in Malaysia has been rather slow, for instance in regulating biomedical advances in Malaysia (Zawawi, 2005). However, we need to balance the need for implementing bioethics guidelines into actual practice with concerns about their appropriateness for the culture.

Assisted Reproductive Techniques

To date, the Government is in the midst of introducing a new Reproductive Human Cloning Bill. The draft is currently in final review by the Attorney's General Chamber. In regard to biomedical advances, the Code of Practice and Guidelines for Assisted Reproductive Technology (ART) has been issued to all specialised centres, including eight government hospitals and 32 private clinics. The practice of ART in the former relies on the decision by the Hospital Ethics Committee; while in the latter, are left unregulated. The introduction of the Code is to give guidance about proper conduct of licensed activities. It assumes that everybody working in licensed centres will at all times observe the general standards and requirements of good professional practice.

There are several guidelines prepared by other professional medical bodies that have been referred to

from time to time in formulating provisions of licensable activities in specialised centres. These include: Accreditation Standards and Guidelines for IVF laboratories (Association of Clinical Embryologists) published on March 1999; The Management of Infertility in Tertiary Care (Royal College of Obstetricians and Gynaecologists (RCOG) published in January 2000; Guidance in the Inspection and Provision of Counseling in Assisted Conception Centres (British Infertility Counseling Association (BICA) – published in October 1999 and Guidelines for Nurses Carrying Out Embryo Transfers and Intrauterine Insemination and Guidelines for Nurses Carrying Out Egg Retrieval (Royal College of Nursing (RCN) published in 2000 xxx). For details, see the *Code of Practice and Guidelines for Assisted Reproductive Technologies (ART),* Standing Committee on Assisted Reproductive Techniques (ART), from the Malaysian Ministry of Health, released in May 2002.

For Muslims, the National Council on Fatwa has been the source of guidance for medical professionals and couples alike when seeking clarifications on the status of certain assisted reproductive techniques. *Fatwa* is a religious ruling issued by the Council. However, it is only binding upon Muslims after it has been published in the official *Gazette*. Since matters relating to *fatwa* are under state jurisdiction, the state has no obligation to be bound by the *fatwa,* though it is issued by the National Council on *Fatwa*. The *fatwa* permits the use of any ART procedures so long as they are done by using the gametes between married couples. Otherwise, the treatment is prohibited because it would clearly go against the concept of familial lineage of Islam. For non-Muslims, this issue is left to the private judgment of the couples (Zawawi, 2005).

It is comforting to note that discussion about reproductive human cloning and ART has occurred under the discussion relating to the establishment of a National Ethics Committee. As both subjects are directly under the purview of the Ministry of Health, the two committees are chaired by the Director-General of Health, representatives from Ministries, medical professionals and lay members. The inclusion of laypersons consists of fellow academicians from the disciplines of law, medicine and ethics, religious scholars and non-governmental organisations. The Ministry of Health also has its own Religious Council whenever they would like to ascertain the religious stance on certain issues pertaining to health prior to the issuance of any policy or circular.

The absence of a legally binding statute would possibly lead to abuse of the existing code. Unless a complaint was made, no legal proceedings may be taken against a culprit. The above mentioned Medical Act 1971, for example, only has jurisdiction over medical practitioners registered with the Malaysian Medical Council. No *locus standi* exists to prosecute them, except in accordance with general penal provisions of the Malaysian Penal Code. Additionally, there is no licensing authority or monitoring agency to look at the quality of operating standards of the specialised centres. At present, no safety assurance may be given for any infertility treatment unless specialised centres are registered with the Ministry of Health. Thus, it is recommended that the Minister of Health to make rules to set up a licensing authority and a national registry. This mechanism could be an initial step forward before relevant bills are passed by Parliament.

Emphasis for a comprehensive legislative framework in Malaysia is a critical matter. Of parallel concern is an awareness programme to to improve a greater level of science literacy among the public. The National Population and Family Development Department has no legal machinery to execute its function. Being one of the organs under the Ministry of Women, Social Development and Family it has been successfully conducting activities to enlighten the public about reproductive health issues. Amongst its activities were a Workshop on Buddies Assistance on Reproductive Health 2005 and the implementation of the *Manual of Standard Operating Procedures on Reproductive Health* as the source of guidance for all specialised centres offering quality infertility services. Aside from that, they have set up an Ethical and Research Committee on Reproductive Health.

The closest forthcoming event is the South-South Cooperation in Reproductive Health in Malaysia Workshop, "Reproductive Health: Towards Family Development", held 26 September to 1 October 2005 in Kuala Lumpur. This workshop and associated project aims to increase the utilization of reproductive health services through knowledge and experience-sharing within as well as among countries. Hence, it may be that the project may strengthen the capacity of the agencies within the South-East Asia region and other countries as well, particularly to organize, manage and monitor broader, integrated reproductive

health services/activities. The project is executed by the National Population and Family Development Board (NPFDB), an agency under the Ministry of Women, Family and Community Development, Ministry of Health, *Federation of Family Planning Associations Malaysia* (FFPAM) and the UNFPA. To achieve the above objectives, this project is organizing a number of technical meetings and inter-country training activities in 2004 and early 2005.

Organ Donation

The monitoring of practice is limited to the organ procurement process in government hospitals, not private ones. So, the issue remains unresolved. No legal proceedings may be sought against any conduct contrary to the circular. Only disciplinary action could be taken against surgeons if something went wrong in the course of the operation. Neither provision, directives nor good clinical practices have ever been mentioned that encapsulates them as one of the ethical compartment of the profession. In this regards, the Malaysian Medical Council would be better positioned to look into the affairs of doctors as a self-regulatory body made up of doctors. Despite this controversy, the Health Ministry now has finalised proposed amendment bills to the existing Human Tissues Act 1972, and they were tabled in Parliament in late 2005.

The Governance of Biotechnology

The commitment of Malaysia to agricultural biotechnology was put under considerable attention by the setting up of the National Biotechnology Directorate (NBD) in May 1995. NBD was given the task of spearheading and coordinating biotechnology research in Malaysia. The research activities carried out before were less focused and scattered, often universities and government research institutions conducted their research and development (R & D) according to their priority. The Biotechnology Cooperative Centre (BCC) was then introduced under the auspices of NBD. The biggest project that is ongoing now is the National Biotechnology Programme. The government has now detected a relevant *niche* for conducting research in tandem with the aspiration of the nation and rapid technological advances in biotechnology worldwide (Harmin and Ibrahim, 2005).

The Government also concentrates on communication programmeming, particularly in developing collaborative networks and smart partnerships with foreign institutions, human resource development and management of intellectual property rights, biosafety and access to bioresources. A concrete example is the Malaysia - Massachusetts Institute of Technology (MIT) Biotechnology Partnership Programme (MMBPP). The pilot project has established National Biotechnology and Bioinformatics Networks (NABBInet).

By the introduction of the National Guidelines for the Release of GMOs into the Environment in 1997, a Genetic Modification Advisory Committee (GMAC) was set up under the supervision of the National Committee of Biodiversity and The Ministry of Science, Technology and Innovation.[49] The guideline clearly stated that any risk associated with the use, handling and transfer of GMOs must be identified and safely managed. To maintain monitoring, every institution, intending to release GMOs must establish an Institutional Biosafety Committee (IBC) within their institution. The members must be well-versed persons in genetic modification technique and capable to assess risk associated with such activities. The IBC must also possess the capability to assess whether the risk involved could affect the public as well as the environment. Aside from that, there are committees and departments responsible for the structural planning of biological diversity in Malaysia:

49 The triple bottom line reporting concept introduced by John Elkington in *Cannibals with Forks* in 1997 focuses not only on economic value, but also on environmental and social values added or destroyed. Professor Buckeridge suggests that "…a triple bottom line may also be flawed, as it ignores the impact of technology: all too often we have found sustainable development projects flounder because the technology to implement the project has failed. In this paper, a "4 Es" approach to sustainable practice is advocated: Ethics, Environment, Economics and Engineering, wherein ethics includes social, cultural and spiritual perspectives, whilst engineering includes the availability of appropriate technologies. In a sense, to proceed without due cognisance of all the four Es is unethical."

Buckeridge, John St. J.S. Development of Ethical Norms: A Natural Imperative Obfuscated by Culture, Politics and Economics. 1st Baltic Sea Conference on Sustainable Development, Hochschule Wismar University of Technology, Business and Design, pp. 122-130.

1. The National Committee on Biodiversity (NCBD), which guides and co-ordinates the planning of biological diversity within the country;
2. The National Technical Committee on Biological Diversity (NTCBD), which is an advisory body to the NCBD on technical matters;
3. Task Force on Country Study on Biological Diversity (CSBD);
4. Task Force on Access to Genetic Resources; and

Task Force on National Policy on Biological Diversity (NPBD).[50] The Government allocates a provision of RM 500 million under the Eighth Malaysian Plan to keep the country's capability in pace with tight competition in the biotechnology market. To ensure conformity to the international standard, Malaysia also has ratified the Cartagena Protocol on Biosafety in 2003 that attempts to minimize the adverse effects of modern biotechnology on the environment and human health. The country is bound to conform to this agreement, which regulates the import, export, handling and use of genetically-modified organisms (GMO) (News, 2005).

Regulating Biotechnology

The Biosafety Bill and the Access to Natural Resources and Benefit Sharing Bill (ABS) are to be tabled in Parliament sometime in 2005-2006. The Biosafety Bill is intended to regulate all activities relating to GMOs and products made from them and assessed for its safety for consumption and ecological system. To ensure regulatory mechanism, the National Biosafety Committee is set up to conduct thorough checking on the safety of the product for importation, field trials, commercial planning, marketing and export. By virtue of provisions under the Bill, the applicant shall first obtain financial security, either by way of insurance or any other form before delivering the product into the market. It further proposes to impose much heavier penalties as compared to the other existing laws on environmental protection or human health; i.e National Forestry Act 1984. This strict liability requires the applicants to give full account for any ill effects to the ecosystem and biodiversity, as well as direct and indirect implications on the economy, cultural and indigenous knowledge and practices (Ai, 2001).

Despite criticism against the troublesome and costly procedure of application for approval, some claim that the bill is overcautious. Another criticism relates to labelling and identification to trace products' actual sources. These issues are surely of importance for review. However, the notion of security and safety in using GMOs and its products deserves to be the overriding issues. Action on feedback received from the stakeholder during consultation needs to be undertaken, particularly with regards to the policy on scope, labeling, export and contained use (Kelthom and Hassan, 2005).

The launching of the National Biotechnology Policy in early April 2005 marked an improvement of strategies underpinned by nine policy thrusts. Agricultural biotechnological development, healthcare biotechnology development, industrial biotechnological development, research and technology acquisition, human capital development, financial infrastructure development, legislative and regulatory framework development, strategic positioning and government commitment. The policy has put forward a clear and systematic structure of monitoring activities by the setting up of the Malaysian Biotech Corporation (MBC). At this juncture, MBC will oversee the development of Malaysian's biotechnology industry by providing the required incentives and guidance for research & development and ventures alike. The emphasis on monitoring activities may allow for a changing paradigm in the biotechnology landscape in the near future. By the year 2020, Malaysia is expected to be a global player in biotechnology, and will generate at least 20 global companies (MOSTI, 2005).

The Government also has to convince multimedia companies that their investments are secured with the presence of safety assurance. Duties, therefore, rest with the Malaysian Biotech Corporation

50 Health Research Council of New Zealand Guidelines on ethics in health research http://www.hrc.govt.nz/assets/pdfs/ethgdlns.pdf and the Ministry of Health's Operational Standard for Ethics Committees. http://www.moh.govt.nz or http://www.newhealth.govt.nz/ethicscommittees/

as a regulatory agency to ensure legislation is appropriately written and implemented. They are also responsible for creating standards and a proper procedure that articulates parallel consideration of cost and industry feasibility. This is necessary to avoid wasting time because of ill-informed rules (even if well intentioned), or from applying overcomplicated inaccessible rules. On that basis, national policy makers should take these points into account:

1. Regulatory overview must be product-based legislation, not process-based;
2. Any biotechnological product must undergo review process to ascertain the protection of public health and environmental safety;
3. Regulatory requirements for new biotechnological products should be integrated into the overall regulatory scheme that govern the release of new products in the agricultural and consumer products sector; and
4. Regulatory programmes must be flexible to enable much quicker adaptation to the new knowledge and understanding following the advancement of biotechnology.

It is remarkable to notice that the regulatory regime must achieve equilibrium between the public safety of the technology and maintaining flexible rules that are not unduly harsh towards biotechnology companies. Scientists involved in an experiment must pay extra care to risk assessment and management of modified organisms under their control. Anybody working with modified organisms also needs adequate protection by providing them with suitable clothes. Besides, it is desirable to monitor, with consistency, environmental issues in respect to the release of GMOs. The safety of biotechnological products must be cautiously scrutinised through labelling procedures.

Public Participation in Biotechnology

Since biotechnology deals with people's lives, the Government needs to give them sufficient understanding of the matter, including the potential benefits and hazards, and the freedom to make the right choices. For that reason, the Government must be seen to be doing a good job in dissemination of biotechnology information and, at the same time, provide a proper channel for feedback. In Malaysia, though relatively new, the Government has started promoting biotechnology at educational institutions for educators and high school students. Indeed, some NGOs have been actively participating and conducting conferences and public talks, including:

1. International Life Sciences Institute (ILSI) Southeast Asia Region held a series of training workshops on safety assessment of GMOs in 2001 for government officials of the ASEAN region. The second workshop was held in Kuala Lumpur on 20-22 August 2002;
2. International Service for the Acquisition of Agri-Biotech Applications (ISAAA) and Monash University Malaysia (MUM) with Malaysian Agricultural Biotechnology Centre (MABIC) held a public seminar on GMOs; and
2. Consumers' Association of Penang (CAP) is an active exponent pertaining to safety issues on biotechnology and GMOs.

Since no official survey has been conducted to determine the level of knowledge and attitudes towards biotechnology towards GMOs/biotechnology in Malaysia, a baseline must be provided to enable more public participation and awareness (Kelthom and Hassan, 2005).

Conclusion

Malaysia has created its own way of reviewing the existing biomedical advances and agricultural biotechnology policy. Albeit relatively new in developing policy, these attempts are welcomed and highly appreciated in efforts to resolve problems in spite of spending much time to develop proper fora for discussing the issue. Since Malaysia is a multi-cultural society consisting of various religions, such sensitivities have to be accounted for prior to the issuance of any policy. The setting up of a

relevant committee for bioethical issues, indeed, invites the public to participate in giving constructive criticism. However, the discussion has not yet reached all levels in the community. Unless corporate bodies support the government in its allocation of finances, the effectiveness of a public awareness programme is doubtful. Therefore, all concerned parties must increase collaboration so that successful activities may be carried out in the future.

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Discussion

Discussion and discourse at the conferences account for a significant part of the meetings. They are often wide-ranging and equally thought-provoking. Excerpts from some of the discussions are, thus, provided in the following pages. They are identified by the titles of the presentations after when they occurred.

Shinryo Shinagawa (Japan): Bioethics in a Wider and Probably Original Sense

Abnik Gupta (India): When we talk about bioethics and medical ethics in a wider sense, on one hand we are talking about brain death and organ transplantation and similar problems raised by advanced technology, but in many developing countries and undeveloped countries the basic question for most of the people is not having access to drugs or other medical facilities. Also issues such as globalization and its impact on generic drugs, and drug availability. Given such a disparate situation, how do you really resolve these issues? What should be done in the future because, otherwise, a very large section of humankind faces totally different kinds of issues to the mainstream Western bioethics. These are very basic issues, and a lot of ethical contradictions arise. How do we really resolve this in the future?

John Buckeridge (Australia): It's rather refreshing to hear a person from the discipline of medical speak about having bioethics going back to its original definition to include the environment. I was under the impression that at one stage, though I may be of a very small minority here, at COMEST and IBC meetings in 2005, the comment was made that when talking about "bioethics" in its current form, the environment is just too complex and there's just too little time. Now I took considerable exception to that. Because if we destroy the environment, we destroy ourselves, and on that basis, I would like to very sincerely thank this presentation here, because I think it goes right back to what we're all about here. That is looking at bioethics as being a holistic, rather than simply medical, ethics.

Irina Pollard (Australia): I would like to really also reinforce the importance of widening ethics to include the transgenerational ethics. Ethics is really important now, because of new genetic insights of epigenetic inheritance, as well as the genetic inheritance. Mostly we've been thinking about mutations in the slow, evolutionary ways, but there is a lot of evidence now that the subsequent generations actually epigenetically inherit lifestyle factors, even in the simple things like nutrition, the environment the sperm mature in, the environment the egg matures in, and prenatally for the embryo, and the foetus. All that already influences the sort of individual that person is going to be and it's potential, quite apart from genetic inheritances. There again, I want to reinforce John's comment, and what you were saying, it is so important to widen bioethics.

Subrata Chattopadhyay (India): This is concerning the ethos of the terms 'developed' and developing' in our discussion. Is it ethical to describe a country developed simply because it is more rich, or is it in terms of human decency? I mean, consider a city like Bhutan where there is no prostitution, no begging, no unemployment and no violence, and compare that to the USA. So is it ethical to consider Bhutan as 'developing' or 'undeveloped', and the US 'developed' simply because it is more rich? So, please I would like you to reconsider using the terms 'developed' and 'developing' only in terms of money and economics.

D.S. Sheriff (India): We can say that Eastern culture is very rich, so they got 'developed' in the ethical context. Perhaps for the Western we can say they are still developing.

Peggy Fairbairn-Dunlop (Samoa): Is there a 'Greater Good?' Ethics Policies in the Pacific

Jadsev Rai (India): As a general comment, you said there is a different concept of informed consent in the indigenous population. This is something that I think obviously will emerge from the conference given various people here with different backgrounds, countries and cultures. As a general comment on international conventions and therefore the latest theories in politics — most of you have heard of a substantive book by Negri called *Empire* where there is a lot of discussion, that we are now moving into a world where there are sort of UN-led conventions becoming the norm across the world. In cultures with many individuals there is sort of an imperialism without the imperialist, and these conventions are the new imperialism of the world. There is a lot of concern about this trend, and since you are working for UNESCO, I wonder with this example if we should be moving towards a convention of bioethics systems, rather than an international convention of instruments, to avoid such a catastrophe in the future.

Peggy Fairbairn-Dunlop (Samoa): Sorry, I haven't worked for UNESCO for long. It is something that really has to be considered and the Pacific is starting to review and evaluate international conventions. The example that I was going to use was the Convention of the Rights of the Child, as well, that Pacific countries are starting to adapt those key principles to their Pacific situation, not just accept them wholeheartedly as we would have in the past.

Ivo Kwon (Republic of Korea): I have two questions. I wonder, in this rapid changing and industrialized world, is it possible to preserve the Pacific Island culture? It's the first question. The second is: If so, it is justifiable on what basis? I feel some contradiction between group informed consent and the individual informed consent. It is a very clear contradiction. I think it is hardly practical in a social world like we have to just evaluate and consider the cultural diversity in many minority groups.

Peggy Fairbairn-Dunlop (Samoa): Yes, that is right. There are considerable tensions. But on the other hand, I think countries like the presenters who have presented, was it the women's model, before, in the Pacific- relational concepts, if you like, research, and offer alternatives which other countries in the world should be considering. We should, if we can, stand firm on those ones which are doable. I guess that's all I can say, really, given the extensive migration in the whole global community. But in some parts of the world there are different values and for many people in the world, those values are still observed and still meaningful in everyday life. If we want to protect our human-ness, if you like, then that's what we should strive to aim for, rather than economic gains.

Ken Daniels (New Zealand): Thank you, Peggy, for a very helpful presentation, especially given the way it linked in with other earlier presentations. The question that I'd like to ask you to explore a little bit, I guess, is given what some people would talk about as traditional paternalism that has been present in many Pacific nations, what's the implications of that in terms of moving towards the kind of policies and approaches that you were outlining?

Peggy Fairbairn-Dunlop (Samoa): I guess I am talking in ideals, but I am talking in ideals that are very real in the Pacific, and practiced in the Pacific right now. But as you say, as Pacific Islanders migrate, and watch a lot of TV and are educated, there are great changes. That question, I wish I could answer. It is the eternal question. Just to finish, to go back to that, I brought with me but I cannot find it now, there was a huge debate in the New Zealand newspapers, I found, about a group of academics, I think, in Auckland University who were jumping up and down about their DNA research. Some professor of philosophy labeled them as those who were holding onto the past and just not recognizing change. In supporting his words, he referred to the writings of Peter Buck, who was writing in the Balkans about the same topic in the early 1930s. The thing we have to keep in mind is that the old world created by Polynesian ancestors has passed away and a new world design process has been fashioned. But at the same time, I do not really see why we cannot fashion a new world according to the values of quality of life and respect for all. These are really values of human beings. Hopefully these sorts of research principles may be taken on by a new group of researchers and they come to new conclusions about strategies and processes that we could be following, which might run parallel to what I would call pure research.

Jasdev Rai (India): My next question is really directed to Darryl, and to UNESCO. I was listening to many people in this conference. One thing is obvious, we have heard from China, from India, and the Pacific as well, that almost all cultures and civilizations have some sort of ethical systems that have worked over the centuries. Now we are being told as if ethics have suddenly been discovered by the UN that are all need a convention. Is it possible to move towards a plurality of ethics, rather than a single convention of ethics?

Darryl Macer (UNESCO): Let's consider that the world realized the UN as an idea in 1945. That is why we are celebrating our 60th anniversary. In the foundations, for example, in the League of Nations and discussions in the global community before the UN was established, ethics was very high on the agenda, as well. Also on bioethics, UNESCO has not made conventions. We have made declarations, which are not legally binding in the spirit of discussion. This is the intention in UNESCO with the Universal Declaration on Bioethics and Human Rights, which has been accepted in Paris by all your governments. It is the first step in the UN system for moving and recognizing that there are universal issues of bioethics. But for our region, there are many serious reservations as have been discussed from the point of view of the Pacific, from the point of view of Asia. There are reservations because of the inclusiveness of the dialogues

leading up to the Declaration, and the dialogue is only just starting. From this meeting, we can see that we have to put much more effort into the dialogue, and certainly we have to bring together (as we have been discussing this afternoon), ways to bring together, to put together to try and hold dialogues, and meetings with much greater resources than the meager ones that UNESCO itself has towards a dialogue that will represent a discussion on these issues and then cultural solutions for each community. Then the words can be implemented into the life appropriately in each culture.

Peggy Fairbairn-Dunlop (Samoa): I think as I said before that isolation from the mainstream is sometimes a real advantage because you build your own resources and patterns for dealing with things and then go on that way. Also given our different historical and cultural processes at the moment, like colonization, we are very much our own self-determined people in the Pacific as much as globalization can be. To answer your question, the declaration I discussed will be passed at the next UNESCO meeting. All I can say is I guess you do need some sort of guidelines, standards or norms. Most societies have norms for what they think are good, and I guess we will use UNESCO norms as the basis here and then we look at the processes and the norms, how they are the same and how they are different. But really, ethics is a process; it always seems to me there needs to be more tolerance in the world of alternative ways of getting places, more collective solutions. So my prediction is that in the Pacific we will develop our ethical guidelines and ethical processes according to our relationships and respect, and those sorts of things. Thus we won't throw out the UNESCO norms, but certainly they are a starting point rather than an end.

D.S. Sheriff (India): Thanks for a very great learning experience in the meeting. I regard it as rediscovering ethics. UNESCO Bangkok has provided the platform to rediscover ourselves and then to develop again. Because many of us don't know what are the conditions and value systems in different countries, but I think I would say it is a rediscovery of ethics so that we can have a better bioethics in the future.

Subrata Chattopadhyay (India): I don't have any questions because you spoke my heart, but what I was trying to emphasize or convey was that before coming to this meeting organized by UNESCO, I was attending a European Summit on Bioethics, and what I find similarly is that actually there is no difference between the European perspective on bioethics and the tone and the ethos of the discussion in UNESCO. Now, what I am trying to address is that ethics is translated in our language as 'needy.' And needy is inherently there in dharma. which is Indian. And dharma is so intertwined with philosophy. So we don't have the watertight compartments of ethics, spirituality, philosophy and religion, and so on. When people talk about ethics as a separate discipline or discovery or rediscovery or re-rediscovery, this kind of sets the tone as if it is something different. So how do you address the issue of the million year old inherent concept of ethics, which is part of the way of life, and ethics, which is a discipline and part of a subject of knowledge?

Peggy Fairbairn-Dunlop (Samoa): That is our challenge, to recognize and to give credit within the predominately Western education systems which many of our countries have now, and to acknowledge and give credit and include and go forward.

Darryl Macer (UNESCO): I would like to ask Leonardo de Castro to make a comment because he is on the drafting group of the Universal Declaration of Bioethics and Human Rights, and also a co-author on the preliminary report towards the Universal Declaration on Bioethical Norms. You can find it on the International Bioethics Committee website, and he is the vice-chair of the International Bioethics Committee from Asia.

Leonardo de Castro (Philippines): First, the Universal Declaration on Bioethics and Human Rights must not be seen as a negation of cultural or ethical pluralities. In fact, the declaration makes a very strong statement somewhere recognizing cultural diversity, and at the same time, this year UNESCO came up with the Convention on Cultural Diversity. So, the fact is that with such recognition, UNESCO acknowledges that at the same time there are very important ethical concerns that transcend national boundaries, which must be addressed and addressed universally. The matter of international health research being done by powerful countries in areas where there are many vulnerable populations is one. The matter of human organ trade is another. We've also heard in the conference about biopiracy. These are international concerns that transcend boundaries and must be addressed and also should be seen as a way of addressing these concerns at the international level without necessarily denying the recognition of cultural diversity and plurality.

Anoja Fernando (Sri Lanka): Just a brief comment about universal norms on bioethics. We earlier discussed about the actual meaning of respect for the dignity of humans. I think it was mentioned that Professor Ida from Japan, formerly chair of the UNESCO IBC, could not actually define it when asked. Actually, I agree with Professor Ida, I also find it very difficult, too, to define the meaning of dignity and respect for human beings rather than respect for human life. Now what I would like to say is, in these bioethical norms, when it was in the very first draft, respect for life was mentioned. But surprisingly it has disappeared from the subsequent drafts. In fact, I did ask why it should be so because I strongly believe that respect for life should be a cornerstone, being a very fundamental universal freedom. We could say something about respect for all forms of life. Still, it is not mentioned anywhere in the declaration. This is because certain countries believe very strongly in euthanasia, and there was sort of a debate. They did not want to include it. I would like to ask Professor de Castro for the explanation.

Leonardo de Castro (Philippines): I thought the explanation was actually that some people who believe that the statement about the importance of human life can be interpreted as a rejection of women's right to an abortion, and that including such a phrase in the declaration would have invited a lot of controversy, and a lack of unanimity regarding the draft. But perhaps there was an angle that I am not aware of.

Darryl Macer (UNESCO): Thank you. So in fact as Leonardo has said, when you include in the declaration a statement for the respect of life, the problem is it opens up the political debates on abortion, debates on the value of different stages of human life, and at what stage in the embryonic development do we respect life to the extent to legally protect it as inviolable. This issue and certain other controversial issues which are not possible to reach international consensus on are not included in the declaration. That is because, I think, the UN has a history of knowing the severity of such debates. They become political debates, rather than merely academic. But it's a declaration that is based on a number of agreed principles across many cultures, and each country has to implement them according to their interpretations. There are other issues of bioethics that will certainly find difficulty to agree upon even within each country. On human dignity, although it's very difficult to define, the reason why it is so apparent in the UN documents is part of the celebration of 60 years. Sixty years ago was 1945, at the end of WWII, no one needed to tell us what human dignity was. You could see the abuses of human dignity after the war. So that is why I think it is so clear in the UN documents. Human dignity is hard to define and, in fact, we should discuss human dignity. There are case studies and other issues because it's a difficult concept. But it's in context; the reason why it is in UN documents is it is often discussed in that context especially. Also, we've heard presentations in this meeting which I think illustrate abuses that are clearly violations of human dignity. So we know where there are violations, and I think we can identify with them. But in terms of philosophy, it is sometimes very difficult. The general conference of UNESCO approved in 2005 the Convention on Cultural Diversity, which will extend the previous Declaration on Cultural Diversity. These have been controversial, but were approved by the UNESCO General Conference. Also, 2006 is the UNESCO year of the ethics of dialogue among civilizations. So I hope that this interactive discussion will be taken very seriously amongst various sectors.

D.S. Nesy (India): Indian Ethics and Contemporary Bioethical Issues

Subrata Chattopadhyay (India): The question is that you have equated India with Hinduism. I appreciate the spirit behind it, but some people may not be very comfortable with the idea of equating India with Hinduism, because there are more than 200 million Muslims, as well as Christians and Buddhists there.

D.S. Nesy (India): Thank you for making the comment, but my intention is not to say that all Indians are Hindu, just bringing out the ethical perspective only. Being a Christian, I am still not used to the distinction between being Indian and Hindu.

Nat Tuivavalagi (Fiji): Someone brought up the issue of the kind of question that one is supposed to ask, and it was mentioned that there are some questions that should not be asked. But, anyway, to make this discussion more useful, we have to interact honestly what we believe and what we think. What we have been hearing a lot of is the importance of religion in ethics. This last speaker was talking that in Hinduism, there is a combination of spirit and matter. This is also the case in Islam and in Christianity. Because UNESCO is very much into the education field, one thing that I would like to bring our attention to is the idea of evolution that is being taught in schools. UNESCO can play an important role to get

this issue addressed head on because I believe it is only a few people, comparatively speaking, who are having a greatly negative impact on the thinking of people that we just occur here by chance. Because deep inside they know that humans are a combination of spirit and matter, but when they go to school they are taught this theory that we and slime are the same, we come from the same ancestors and we both just occur here by chance.

Darryl Macer (UNESCO): Briefly, I think if you look at all the UNESCO homepages — and I have not done it — to search the word 'evolution,' you would find, I guess, a Western scientific viewpoint on evolution that's consistent with the natural science. As a Christian, myself, in my time living in the UK when I was researching molecular biology, the questions of evolution, and theistic evolution, were often discussed. The conflict metaphor that Colin Russell wrote about in a famous book in the 1980s was about the conflict between evolutionary theory and Darwinism. It describes in the UK history of the nineteenth century how Christianity was constructed as a way to move the power from the former priests of religion to the new priests of science. Also, if you look at some of the history of England and Europe in the early 19th century, and if you've ever been to the natural history museum in London, for example, it was built as a cathedral to the creations of science to try to move the priesthood from theology to science. There are some interesting books on this. I personally have found no conflicts in the teaching of biological evolution, and they should also be teaching moral values and spiritual values and I don't find any conflict. I think that it is also probably a general conception of UNESCO's teaching, but I am not well enough informed of the teaching of evolution in UNESCO circles to answer that. During the discussions we held as members of the UNESCO IBC in 1993-1998 while drafting the Universal Declaration on the Human Genome and Human Rights, we found that the common genetic origins of all humans, and all life, should be a reason for all life to be respected more, and for all to be ascribed dignity. This reverence for life is found in the UN writings, and you could apply this to the teaching of persons about human dignity.

Jeong-Ro Yoon (Republic of Korea): Whither the ELSI Programme in Korea

Aamir Jaffrey (Pakistan): As Korea leads the way in stem cell research, and as biotechnology has gone along this rollercoaster ride, do you feel that bioethics has followed the science in this ride? You mentioned on one of your slides that there is a gap between what scientists don't know and what lay people know about this. Please correct me if I have misunderstood this, but I believe the gap is actually narrowing, not widening, with so much information now coming on the internet, and the media and newspapers. Everyday you have headlines not only in your scientific journals, but also in the newspapers, on topics such as social research on science, embryo clones, animal clones, etc. Thus, I think the gap is actually narrowing rather than widening, and the lay people are also finding more and more about stem cell research. Therefore, that should make it easier for the scientific community to explain things to the people, rather than more difficult.

Jeong-Ro Yoon (Republic of Korea): People get in touch with more and more information on the successes of scientific and technological research, but I don't think it necessarily implies that people are more and more informed of the implication of those technological successes in their own lives and especially in the lives of future generations.

Miyako Okada-Takagi (Japan): You mentioned the Korean research group, which claimed to succeed in human embryo cloning from cells. I am wondering about the Korean women, and why a lot of the young Korean women donated their eggs without any money, even money for the transportation to the hospital for donation, which I read about in a Japanese journal. In Japan, it is quite impossible for women to consider to donate eggs without anything and just for the research purpose. So I would like to know how the Korean women are thinking about the donation for the research purposes?

Jeong-Ro Yoon (Republic of Korea): I think the major accomplishments of bioethics groups and NGOs in Korea over the past maybe decade, is that at least scientists and policy makers got to be aware that some kind of ethical involvement or procedural justice has been involved in the conduct of the research. Actually, Professor Song is an expert on this case, and Dr. Kwon is going to talk more about the current

state of stem cell research in Korea, as well. I understand that Dr. Song sent a letter to the journal *Science* in 2004 criticizing the ethical procedures involved in Dr. Hwang's research, but as far as I know, for his research for the publication in 2005 informed consent was said to have been conducted in the proper manner. What I heard from colleagues who have investigated it is that many young Korean women are really happy and willing to donate their human eggs, even after being informed of the health risks involved. They volunteered to donate the eggs so the ethics team involved in that research had to dissuade many women not to donate their eggs. So they had to select only some donors. So I think maybe it is some kind of cultural difference. We have to conduct more research into that kind of practice of citizens in Korea. There must be other issues involved in addition to the individual health risks, so that is a matter maybe of cultural difference, or something ideological or whatever. There are some different values.

Soraj Hongladarom (Thailand): Bioethics and Interdisciplinarity

Morgan Pollard (Australia): I study environmental science, which by its nature is highly interdisciplinary. I would like to suggest that the subject that can bind together knowledge about the way that different disciplines and almost everything can be analyzed are systems theory and complexity theory. I think that they're the future of science. The study of complex systems has an extremely useful application to helping manage the future.

Soraj Hongladarom (Thailand): I agree completely with you that this is the future of science. For example, physics and chemistry are fusing, and so are biology and information science, and so are all others. So I just want to raise this issue of academic disciplines not being written in stone, so to speak. For me, this is something that is new.

Heiko Zude (Germany): I have one critical remark to your presentation. I missed the historical dimension as you told us of bioethics as a discipline, and I think this is due to the dominance of analytic philosophy. I am a bit critical about it because I think that if you don't mention the historic dimension of ethics or bioethics, you are cutting the roots of your own identity if you do bioethics. I think this is typical for this method in the tradition of analytic philosophy.

Soraj Hongladarom (Thailand): You seem to think that I am advocating cutting the roots, but actually I am not doing that. What I am doing is that I am thinking of and reflecting on the nature of bioethics as a discipline. I am focusing on the activity of teaching bioethics in universities and the activities of bioethics associations. There are several of them in the world which we all know of, as well as the activities of organizing conferences and having journals in the field. All of these activities comprise bioethics as an autonomous discipline and I am not saying anything against the root of bioethics. I have not done much research on the history of bioethics, from my knowledge it started from possibly a group of philosophers who talked with a group of medical people and then the issue kind of developed into what we have today. But I am not saying anything against the history.

Subrata Chattopadhyay (India): This is something that is related to the nature of bioethics as a separate discipline, with my scientific training and background. I would like to say that only recently I had some formal exposure to philosophy, and I believe it has changed the way I think. Now, do you think it would be a good idea that scientists should have some background or exposure in philosophy, or philosophers have some hands on experience with science? Because sometimes I think they philosophize too much. Also, we in the scientific world tend to think only of things in the technical reasoning. I think we are too much objective in science.

Soraj Hongladarom (Thailand): Yes, this is a very good idea and should be emphasized from the first year of study upwards in the university. My point in the slides I have shown you is that I said something like students should be well grounded in their own discipline before they reflect on bioethical issues.' But this does not mean they are shut off and they don't have to study anything that is at their next door office, so to speak. So it is crucial that scientists know something about ethics, and ethics is what bioethics is all about. Also, equally crucially, philosophers or people from the social sciences need to know something, and I think this is what is so fascinating to me about bioethics. We do not have many opportunities for social scientists, philosophers, lawyers and molecular geneticists medical people in the same room, you know, each understanding each other. So basically I agree completely with your point.

John Weckert (Australia): Should the Precautionary Principle be Applied to Nanotechnology?

Morgan Pollard (Australia): I'm interested to know on what grounds the gray goo catastrophe or the manufacturing of substances in nanotechnology would not necessarily be feasible, because DNA replication on the same scale can in fact occur.

John Weckert (Australia): I think that's a good point. Rather a lot of nano-scientists aren't particularly worried about the gray goo problem, but they do talk about a green goo problem, which is more the one you're talking about. It is where nano-techniques are linked with various things in biology, so then you get viruses or something running amok. So it is a problem, but it seems from all I've read and from the scientists I have spoken with that it is not so much a sort of a traditional gray goo problem that Drexler talks about. It's more to do with once you start playing around with some of these living things.

Morgan Pollard (Australia): Its not my belief, just quickly, that you identified, that different cultures have different perceptions of the precautionary principle. It's my belief that scientists are taking the public by stealth, if you like, on this issue. The dangers have been underestimated in order to facilitate the economic development of nanotechnology.

John Weckert (Australia): I think there is an interesting point lying behind what you're saying. The nanotech community in Australia, and possibly in other parts of the world, has been very keen on getting public discussion and ethical discussion about the technology. But one of the worrying things in my point of view is that they seem to be doing it so there isn't a public backlash, so the public is well educated in certain ways and will accept it. Now I think that's a worrying aspect, and I think that's an ethical issue in itself, sort of the meta-ethical issue concerning the whole debate.

Irina Pollard (Australia): Advances in Neuroscience and the Precautionary Principle: What Can Bioscience-Bioethics Teach Us?

Subrata Chattopadhyay (India): Thank you very much for your clear, very interesting and nice presentation. The question is regarding the enhancement of memory. In the 1960s or early 1970s probably, when Thomas Moody and Edmund Moody came out with the book, *Life after Life*, describing near death experiences, people can see what could be the hidden memory. After that, there was discussion of regression therapy where the psychiatrist could bring back the memories of the past lives. Now there has come out a book that says that with the progress in therapy, we might explore future lives from the neurophysiological basis. Do you think its possible, that in terms of scientific knowledge, that it is really possible that we could tap the hidden memories of our past lives, and its also possible in terms of scientific knowledge, to have the potential scenario of future, not memories because memories are in the past, and to see our future possibilities? Because our forefathers have all said that it is all there in the memory. If the memory is there then we remember and it is real, if we don't remember it is unreal. For example, can we remember of life *in utero*. We know it exists, but we do not remember. But given the resources of hidden memory, do you think it is possible?

Irina Pollard (Australia): It may be possible, I don't want to really make comments about past lives, but certainly with the memory as neuroscience is being consolidated. How the brain works... I didn't have time to actually describe which parts, but it's in the emotional brain that judges whether a memory is worth remembering, and it also controls the stress response, so that if a memory is important enough, it will then signal the hippocampus to lay it down for a consolidated memory. So memories are very labile and there are systems that happen there. If a memory in time, if it is not useful anymore, the hippocampus, it will be removed and you will forget. So the memory consolidation is a system that allows us to survive in the present. We use useful past experiences to live more effectively in the present. So there is one danger which psychologists have found out: You can have a false memory syndrome where if its adaptive to you to remember something, maybe whether its unpleasant or pleasant or something, then the hippocampus will change the original memory to a memory that is more adaptive, and this may not resemble the truth. That is a danger and psychiatrists now are aware of this. For example, there are patients who say that they have been sexually abused by an uncle or a father and it wasn't true, but

then again you can retrieve real memories, and it might have been true. So I think memory enhancement with the tablets, it's the present. Like Ritalin actually would enhance memories, all memories, whether significant or not, under the drug, so you will remember what you had for breakfast, but that's not going to help your survival. So you're going to crowd yourself out by having a lot of consolidated memories and not that much selection under the present medication. I hope that answers your question.

Subrata Chattopadhyay (India): Related to that then is it possible to bring back the memories of life in utero?

Irina Pollard (Australia): I think that would be possible because the term foetus and the newborn are almost the same. Because everything that the term foetus does, except living outside and breathing, that sort of thing, all the systems are already ready for birth, so that transition is a great transition. But in the form of development, we see a lot of foetuses are born early and they have to be going into incubators because they're immature. A foetus that is born at full term is born large and actually ready to live outside the uterus, so the brain has got prenatal memories. It's been shown that prenatal memories which are unpleasant do affect the offspring in the same way as pleasant ones. I've seen pictures where the foetus actually smiles, does laughing movements, there are also crying movements, they suck their fingers, they're like newborn babies. So yes, they do have memories, not sophisticated ones, but they do have emotional memories.

Mary Rani (India) I would like to know your opinion about neurolinguistic programmes (NLP), and its telepathic aspect. It could be used to enhance the behavioral patterns of society.

Irina Pollard (Australia): I don't know much about neuro-linguistic programmes, but I think they would be very adaptive. Children, for example, in their first eighteen months make all the sounds that the human voice is capable of making, and the only sounds that the child remembers are the ones that are being reinforced. So if you reinforce certain language patterns, repetitively, it will come into the memory. That's natural, that's one of our truly evolutionary gifts, and I don't think that would do any harm except overloading the brain.

Mary Vimalakuumari Kalaiarasi (India): Sensory Abilities Beyond Human

Senthil Kumaran (India): In your presentation you were told that tsunamis are new to the majority of South Asia, but my opinion is tsunamis are not new to us. Because, as you can say, 3,000 years ago the southern part of Tom Lau Do experienced a tsunami, before that, there were also a lot of tsunamis in ancient literature.

Subrata Chattopadhyay (India): As a person I like to believe that some animals have sensory abilities which we do not, but with my scientific training I find it hard to accept the scientific basis of this finding, because, we need case control studies. Then we can examine statistical differences and then whether it is a chance or whether it is truly what they are sensing. Also there is procedural difficulty. How do you know what they are thinking as we think they are thinking? Do you think there is any solution to the dilemma? Is it possible to scientifically address that issue, in your opinion?

Mary Vimalakuumari Kalaiarasi (India): In my opinion, I think I have mentioned that it is very difficult because of the animal behavior and the communication cannot be given. I have mentioned in my paper that it is difficult to have a systematic control of their behavior since they show lots of behaviors, so these are issues we have to overcome to scientifically prove the ideas.

Morgan Pollard (Australia): It's a good example of a specific case where we could have learned from animal behavior, and its only one example of the more general important points that humans must learn from ecological behavior and follow the ecological constraints in our own behavior. In this way, I think we do, can and should learn from ecology and live that way.

Pornvipa W. Chanakool (Thailand): Science, Technology, and the Supernatural in Contemporary Thai Novels

Subrata Chattopadhyah (India): When you say ineffective education leads to the ideas and notions about science and technology, I was wondering how you feel about when it is said that imagination is more important than knowledge, as said by Einstein. So, maybe they are imagining something which may not fit with our notion of what is right about science or technology, or the supernatural. Anyway, is it not curbing the freedom of expression of the men and women of literature if we say that it is ineffective education which leads to these kinds of ideas?

Pornvipa Chanakool (Thailand): As you know, imagination is the main beginning of literature or novels. What I'd like to say here is that what I found in the literature I studied is that they reflect ideas and measures quite close to the real events in Thai society, so I think imagination is the device of the writer to tell the truth or communicate what is actually in the real society.

Nares Damrongchai (Thailand): DNA Technology in Asia and the Pacific: Scenario for 2015

Peggy Fairbun-Dunlop (Samoa): I like your methodology as a way of looking ahead as a scenario creation. I just wonder, which countries in the Pacific were involved in this?

Nares Damrongchai (Thailand): The project was proposed by Thailand, and the members of APEC who were involved were Canada, New Zealand, Japan, China, Taiwan, Australia, and USA.

Peggy Fairbairn-Dunlop (Samoa): In my thinking, in the actual scenario creation, there were no Pacific countries involved, because the Pacific means the Pacific Islands.

Nares Damrongchai (Thailand): When we discuss in the APEC, we often think of both sides of the Pacific Rim. I think Australia and New Zealand are Pacific countries.

Darryl Macer (UNESCO): The Pacific in many definitions includes the Pacific Rim countries and that's APEC. In UNESCO, we have a Pacific cluster of countries which does not include many of the rim countries.

Tran Han Giang (Viet Nam): Challenges for Gender Studies in the Era of Ever-growing Biology

Ivo Kwon (Republic of Korea): Before I came here, I set up the Korean Society for Gender Specific Medicine. I think your presentation has some relation with gender specific biological research, but your presentation is quite different from what I expected. I think you discussed the future, which many accept as fantasy, where we can choose our sex and I think choose the human. I think these are far from the situation now in medicine. I think the more important thing is we have gender inequality in medical research, because over two thirds of all medical research is about only men. We don't have enough data about women. I give you an example: 10 or 20 years ago there was a big project in the United States and their research was on whether aspirin will protect against angina, or cardiovascular disease. But their research was only looking at men. In March 2005 in the *New England Journal of Medicine*, a new study was published that only studied women. The results were contradictory to the previous research. Nowadays, women eat aspirin for nothing, as it has no impact for them. We find more differences and gender specific biological phenomena between man and woman. Some feminists are worried because they think the women and the man are naturally the same. I think we will see the appearance in the field of gender specific biological research.

Tran Han Giang (Viet Nam): I was talking more theoretically. In structural theories of gender, we are arguing about the functions of the man and woman. Gender theories were made from the 14th century There are not dramatic updates in the theory seen today from then. I mean that in the 14th century we already had the biological foundation for feminists and gender theory. The question was in the 14th century, the feminists and the gender theorists didn't have any scientific foundation to develop. It

was in the 18th and 19th century that the feminist and gender theorists came up with conclusion that you have two biological foundations for theorizing about their findings. Now you gave me the new information about the theories of the biology, that we should not only do the experiments with men, but include women. We gender theorists do not do the biological experiments, so we will process such information from biologists, for example, on experiments in the brain functions. Such experiments will help us defend our arguments about the functions and abilities of men and women.

Abnik Gupta (India): You are trying to relate feminism and gender studies with advancement in biological research. Now with the breakthroughs in biological research, I think the role of males in reproduction is going to be more and more irrelevant, and therefore I think in the future, female subjugation, at least on reproductive terms, will be over. How do you react to that?

Tran Han Giang (Viet Nam): It is a big question. I mention here that now biology gives us a very important foundation for gender theories, so far that gender is changeable. It is socially and culturally changeable, for example, taking care of children, taking care of ill members of the family, and doing household chores. I do hope that biology can help us change the nature of embedded functions of men and women. Men will now be able to bear children and women will take care of the household and will be the breadwinner for the family.

Darryl Macer (UNESCO): It is an interesting issue of how gender roles get promoted and changed. In questions about the topic of child-bearing, I found in Japan that more men were less willing to become pregnant than in some countries, but also I found some women felt that they would lose their meaning if men could also become pregnant. I found that rather sad that we couldn't do it half and half, you know, one after the other taking turns. It seemed like a good idea based on equity, but there are many interwoven cultural issues.

Irina Pollard (Australia): My comment was related to Anil Gupta's previous one. Many biologists, now that more and more is understood about the sexual differentiation of human beings in a biological sense, prefer not to talk of gender — which is a social concept — but feel that there are as many sexes as there are human beings. The human sexuality is an open frame and there is a lot of recent information coming out, for example, with the opening up of what transsexuals feel. At least in the West and in Thailand there are a lot of trans-gendered transsexuals. Recently, I saw a paper that showed that transsexuals have slightly different genetics. They've got changes in some of their genes that control sexual differentiation. It is identifiable, and it is not wise to assign a sex to anyone and then assign a corresponding gender because the biology is moving.

Tran Han Giang (Viet Nam): Yes, I think it is the nature of the changeable human being. Your example is that the concept of sexuality changes from generation to generation.

Irina Pollard (Australia): Yes, what it means to be a male or a female in biological terms. You mentioned there is maybe a third, but there's probably millions. It is a continuum from complete maleness to complete femaleness.

Tran Han Giang (Viet Nam): Yes, I think it is difficult to discuss in terms of the broader, the gays and lesbians existing now in the world, and the number of gays and lesbians is increasing now. But here, you know, I don't want to make the issues broader, because here I want to raise only very basic issues in relation to the gender theory and the biology.

Irina Pollard (Australia): I understand that. You mention lesbianism is increasing. It isn't really, it's been about the same for thousands of years. Only the identification, now that the gay community can openly acknowledge their gayness, it seems to be increasing, but it's always been around: 10% of the population, and the same thing with transsexuals. It's something like, perhaps, 2% of the population.

Tran Han Giang (Viet Nam): Yes, I agree. We can make the theme broader, but I understand that it is one of the big questions that we, the gender theorists, should have to put on our agenda and the studies about the new phenomena in society. Actually, we have to try to compare to the time of the 14th or 15th century. In the case of Viet Nam, we can also see societies imitate from the others. It is like the flow of ideas from abroad, and sometimes it is very artificial lesbianism.

Irina Pollard (Australia): Any categorization is artificial, so perhaps leave that alone and let people determine their own sex whichever way and not classify that into a gender mode. which is social.

D.S. Sheriff (India): I agree with Dr. Giang. You cannot call everything artificial because every human being has a sexual preference. For example, there are only two sexes, male and female. The difference lies in the sexual differentiation. If a person is having external genitalia, which is not compatible with the gendered sex, and if it has female genitalia with the male genotype, naturally those people will grow up with the girls so they want to have a girl's orientation and vice versa. So the terminology is slightly different.

Carmel (UK): This is really a conference on bioethics and the kind of research which I give full credit to the speaker is to my mind a construct. We are constructing so many things for research. We want to have gender, we want to have biology, we want to prove that one proves or disproves the other. We are all human beings and human beings are created for a purpose, whatever you like to think. If you look at human nature, it hasn't changed for thousands and thousands of years. I think if we're going to research and to discuss all these things, we have to keep a sense of values. If we want to have people who choose to be out of bounds in one direction or another, maybe that's their prerogative. When we started on this kind of gender research, and I know in some countries like Scandinavia you can get six months baby leave if you're a guy and wash the nappies and the wife can go off and work. It's okay, but what are we really doing? Somebody talked about four thousand years ago, I suggest you all read the I-Ching. The Chinese can tell us something about the role of the creative and the opposite, the yin and the yang. We might be a little bit better in our lives.

Amru Hydari Nazif (Indonesia): Bioethics: Its Relevance to Indonesia

Leonardo de Castro (Philippines): If it is not proper for the foreign researchers to come up with the results solely for the purpose of gaining knowledge, what other purposes should there be?

Amru Hydari Nazif (Indonesia): I know this is over simplifying things, but that particular was taken from analyzing the article that was transnational practices. Transnational practices were formulated in the end that any research should have the clearance of the ethics committee, both where it is conducted and the originating country. That was one, and the second is applying the other principles in terms of, for example, equality, justice and equity. Basically you borrow from CDC in the consent and benefits area. Because within these 15 principles that are finally being adopted now, we also have considerations of benefit and harm, that is article four. Thus, while it is not purely for advances in science and knowledge, for better distribution and benefits of science, research can be justified.

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